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When Can it Be Said, "You Are What You Know"?

A Multilevel Analysis of Expertise, Identity,

and Knowledge Sharing in Teams

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When Can it Be Said, "You Are What You Know"?
A Multilevel Analysis of Expertise, Identity, and Knowledge Sharing in Teams

by

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Individually held knowledge is one of an organization's most valuable assets. The extent to which an organization can leverage that asset depends on its members' not only applying knowledge in their work, but also exchanging and transferring knowledge with others in the organization. We still know very little, however, about why some knowledge workers are more or less willing to share their specialized knowledge with others. I argue that a robust explanation can be found in the risks or opportunities that knowledge sharing poses to personal identity. Specifically, knowledge workers' willingness to share knowledge with others can be explained by the importance they place on that component of personal identity associated with expertise (i.e., their *expertise identity*). I

systematically explore contingency factors that might influence the effect of knowledge workers' expertise identity on their willingness to share knowledge, including other aspects of the self, dyadic social relationships, team identification, and the organizational environment. Finally, I argue that the effects of people's knowledge sharing will be evidenced in the learning outcomes realized by those around them.

I conducted a cross-sectional survey study at a national engineering firm. The final sample included 221 members of 40 continuing teams (55% response rate). In addition to self-report data, surveys captured respondents' round-robin peer ratings of fellow team members on multiple constructs, including a measure of individuals' willingness to share their specialized expertise with others in terms of sharing the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. I conducted analyses using multilevel modeling and social relations modeling techniques. Results supported 4 of 6 hypotheses. An individual's willingness to share knowledge with others was higher when expertise identity was high and dyadic trust, receiver expertise, and team identification were also high. Further, people with high expertise identity were less willing to share knowledge than people with low expertise identity when dyadic trust, receiver expertise, and team identification were low. Implications of these results, limitations of the study, and directions for future research are discussed.

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CHAPTER 1: OVERVIEW

Introduction

Knowledge is arguably an organization's most valuable asset. Knowledge is the means by which firms create value (Nelson & Winter, 1982; Teece, 1981) and develop capabilities that allow an organization to compete effectively (Baum & Ingram, 1998) and to innovate (Nonaka & Takeuchi, 1995). Knowledge is the currency of organizational learning, which forms the basis of an organization's ability to improve its practices (Huber, 1991) and realize efficiencies in the production of goods and services (Argote, 1999). An organization's ability to effectively manage and navigate the increasing maelstrom of scientific and technical knowledge will predict its success in increasingly complex and dynamic modern business environments (Huber, 2004).

Much of an organization's knowledge resides with individual organizational members (Kogut & Zander, 1992). Similarly, the processes of knowledge creation and application, such as learning, innovation, and problem solving, are distributed among individual knowledge workers (Nonaka, 1994). Individuals represent important repositories of the knowledge and expertise that successful organizations use to adapt to dynamic competitive environments (Nonaka & Takeuchi, 1995). This is even more true of knowledge-intensive industries that depend heavily on scientific knowledge (Gittelman & Kogut, 2003), such as computer component manufacturers, biochemical companies, and software design firms. Whereas organizational knowledge may exist in the form

of accessible structures, routines, or cultures, individual knowledge resides in the mind of the "knower," making it difficult to replicate or transfer within the organization (Davenport & Prusak, 1998; Szulanksi, 1996).

Individuals acquire knowledge from a multiplicity of processes, including experience, trial-and-error experimentation, observation, and sources inside and outside the organization (Argote, 1999; Borgatti & Cross, 2003). Through independent experience and learning, individuals not only improve their mastery of established work knowledge and procedures, but also adapt and modify their knowledge and procedures and produce innovations (Gray & Meister, 2004; Nonaka, 1994). Other members of the organization can benefit from the experience accumulated by individuals as well as the natural variation that distinguishes one individual's knowledge from another's (Reagans, Argote, & Brooks, 2005).

The extent to which an organization can leverage individually held knowledge depends on individuals sharing such knowledge with, and transferring it to, others in the organization (Argote, 1999). Researchers and practitioners alike maintain that the sharing of individual knowledge is a necessary precursor to the creation of organizational knowledge that forms the basis of organizational competitiveness (Nonaka, 1994). The effective transfer of knowledge between individuals has been shown to impact an organization's ability to promote best practices (Szulanski, 1996), recombine knowledge to produce innovations (Hargadon & Sutton, 1997), develop new products (Hansen, 1999), and compete

more effectively (Baum & Ingram, 1998). At the level of organizational workgroups, the effective sharing of individually held knowledge has been shown to improve a group's ability to perform well (Lewis, 2004; Lewis, Belliveau, Herndon, & Keller, 2007), transfer knowledge across tasks (Lewis, Lange, & Gillis, 2005), access uniquely held knowledge (Stasser & Stewart, 1992), and integrate individually held knowledge into forms that can be exploited by others in the organization (Okhuysen & Eisenhardt, 2002).

In this dissertation, I focus on an individual-centered explanation of knowledge sharing behaviors between a knowledge source and receiver. Individuals choose to share knowledge with others for any of a number of reasons. Knowledge sharing can be instigated by people actively seeking the knowledge held by a knowledge source so that they may use it in their own work (Hansen, 1999). Alternatively, knowledge sharing can be instigated by knowledge sources actively attempting to transfer their knowledge to others who could benefit from the knowledge (Hinds, Patterson, & Pfeffer, 2001). I argue that, particularly in contexts that involve knowledge work, individuals can vary significantly in their willingness to share their knowledge with others.

In this dissertation, I explore this phenomenon in terms of the following research question: What factors explain knowledge workers' willingness to share their knowledge with others? This research question explores potential sources of individual motivation to share knowledge. I consider how a person's identity, social interactions, and the broader organizational environment interact with the

expertise component of personal identity to affect knowledge sharing. Specifically, I propose that the importance an individual places on expertise as a component of personal identity plays a significant role in knowledge sharing.

Understanding the factors that lead to knowledge sharing is important because it can help explain learning in organizations. Fostering more knowledge sharing can increase learning among organizational members and leverage the valuable knowledge held by individuals. The sharing of knowledge can help others learn how to apply the knowledge for themselves, introduce them to new knowledge and procedures, and spur individual efforts to learn.

Contributions

This dissertation makes at least three contributions to the literature on knowledge sharing and learning. First, this dissertation contributes a novel, identity-centered perspective to explain knowledge sharing. Specifically, I argue that the strength with which a person identifies with that aspect of personal identity that has to do with expertise will predict that person's willingness to engage in knowledge sharing. The impact of an individual's expertise identity will be considered in terms of how its effects are altered by several situational considerations.

Second, this dissertation provides a strong example of the importance of contextualized approaches to management research. By developing explanations that integrate a component of personal identity with elements of the context in which knowledge workers execute and coordinate their work, this dissertation

underscores the power of multilevel approaches that consider the individual as inseparable from the situation. Diversity researchers long have appreciated the importance of articulating effects of individual differences as an integral part of the group context (Williams & O'Reilly, 1998), but such perspectives only recently have become a part of knowledge-sharing research (Bock, Zmud, Kim, & Lee 2005).

Third, this dissertation extends current knowledge-management research by considering knowledge sharing as a specific form of discretionary behavior. Previous approaches have considered knowledge sharing in terms of a person's choice of whom to share with (Reagans & McEvily, 2003) or the usefulness of what is shared in terms of immediate work objectives (Levin & Cross, 2004). However, the perspective I present here considers knowledge sharing in terms of individuals' willingness to pass on their specialized expertise to others as evidenced by the extent to which they are willing to share the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. This approach is consistent with the manner in which researchers assess other forms of discretionary behavior in organizations, namely by considering the extent to which people actually engage in behaviors that are not specified by their job requirements. This is appropriate given that willingness to share knowledge in this fashion is highly discretionary, since it involves elements of individual experience, understanding, and application of expertise that are uniquely known to and controlled by the knowledge source.

Applicability

The discretionary nature of knowledge sharing is especially relevant for so-called knowledge work contexts, in which the value of work depends heavily upon people "who have high degrees of expertise, education or experience, and whose jobs involve the creation, distribution, or application of knowledge" (Davenport, 2005). Examples of such organizations include professional organizations (such as consultancies and professional services firms), organizations that rely on team-based structures (such as those engaged in software development or engineering), and communities of practice (such as research and development groups).

Outline of this Dissertation

The remainder of this dissertation is organized as follows. Chapter 2 reviews the relevant literature on knowledge sharing and explains how support for individual-centered perspectives on knowledge sharing has eluded researchers. I present theory supporting an expertise-identity-centered explanation of an individual's willingness to share knowledge. I then present hypotheses to explore the manner in which expertise identity interacts with other aspects of the self, a person's social interactions, and the broader organizational context to predict willingness to share knowledge. Finally, I present a hypothesis about the learning implications of discretionary knowledge sharing.

Chapter 3 presents the methodology by which the hypotheses presented in chapter 2 are tested. These hypotheses are tested in a field study using a cross-

sectional survey methodology, a round-robin response format, and multilevel modeling techniques. A field setting offers the additional benefit of being able to consider contextual factors in a naturally occurring setting.

Chapter 4 presents the results of my analyses. Analyses are conducted using a multilevel modeling technique referred to as a *social relations model*. This approach takes full advantage of the dyadic structure of the round-robin responses while accounting for the potential overstatement of power inherent in any structure where individual respondents provide multiple ratings. Finally, chapter 5 presents a discussion of the results, implications and limitations of the study, and directions for future research.

CHAPTER 2: THEORY

Literature Review

The history of knowledge-sharing research has evolved in multiple directions, including research in the areas of strategy, sociology, organization theory, organizational behavior, and management science. The origins of this multitributary research most likely can be traced to a common interest in the effective application of knowledge as an input to organizational competitiveness. The knowledge-based theory of the firm maintains that a central function of successful organizations is the efficient creation and transfer of knowledge (Kogut & Zander, 1992). Knowledge sharing is widely recognized as an integral component of knowledge transfer, a vital means by which one person learns from knowledge acquired by others, leading to organizational learning (Argote, 1999). Knowledge sharing is an important antecedent to knowledge workers' learning from the experience accumulated by others, particularly in modern dynamic or distributed organizations, where learning by observation or physical proximity may be less feasible (Davenport, 2005). A significant body of research has established that people are better able to transfer knowledge when they work together in close physical proximity (Kane, Argote, & Levine, 2005; Reagans et al., 2005). Proximity is important because it allows people to learn by observation. Although observation is a widely recognized mechanism by which one individual learns from the experience accumulated by another, it is not the only mechanism (Bandura, 1977). Bandura (1977) also described the process of

verbal modeling, whereby "people are aided in acquiring social, vocational and recreational skills by following written [or verbal] descriptions" (p. 39). The importance of such forms of knowledge transfer also has been recognized as a critical mechanism by which interorganizational learning occurs (Huber, 1991).

Knowledge workers acquire knowledge from several sources: (a) through formal education or training (Argote, 1999), (b) as they learn by doing in the performance of their work (Ellis, 1965), (c) in the process of observing others (Nadler, Thompson, & Van Boven, 2003), (d) through informal social connections with other individuals (Hansen, 1999), or (e) by seeking out others who possess knowledge they would like to acquire (Borgatti & Cross, 2003). Individuals are repositories for knowledge in a variety of forms. Individually held knowledge can be comprised of information, such as objective facts and figures. Individuals hold knowledge in the form of data, which is information that has been analyzed, processed, or otherwise transformed through some value-adding process (Stewart, 2003). Individually held knowledge can take the form of tacit knowledge, or "knowledge in minds," which Davenport and Prusak (1998) defined as "a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information." The various bodies of knowledge sharing research can be roughly grouped according to the following categories and will be summarily reviewed in kind.

Network-Based Approaches

Social ties. Sociological perspectives have yielded powerful insights into the types of social relationships people maintain and how these affect knowledge sharing between individuals. Generally, these perspectives can be grouped according to their emphasis on the importance of weak versus strong social ties, which are distinguished based on closeness and frequency of social interaction (Granovetter, 1973; Hansen, 1999). Different forms of social ties in a social network are argued to allow access to different types of information.

On the one hand, strong social ties are argued to be important to the transfer of knowledge because the parties involved will have greater opportunity and familiarity in communications as well as a greater willingness to expend effort in the communication of knowledge (Krackhardt, 1992). Strong ties are also more likely to support iterative two-way interactions, which facilitate the recipient's ability to absorb complex knowledge (Polanyi, 1967). Several studies have yielded support for this perspective. Hansen (1999) studied the effects of strong and weak ties in the context of research-and-development (R&D) projects, finding that completion times were shorter when organizational units relied on strong ties to transfer more complex knowledge and longer when they relied on weak ties, supporting the premise that strong ties are sometimes more effective for the transfer of complex, noncodified knowledge. More direct support for the importance of strong ties to the transfer of knowledge can be found in a study by Ghoshal and Moran (1996), who reported a linkage between party connectedness

and the receipt of useful knowledge. Szulanski (1996) found that strong ties can help overcome the natural impediments to the transfer of best practices within a firm, suggesting that strong ties may promote more effective sharing of knowledge relevant to the transfer of these practices. Research conducted by Uzzi (1996) has shown how the socially embedded nature of ties between firms provide the principle medium by which reciprocal knowledge exchanges—including knowledge sharing—take place, allowing knowledge to transfer more effectively from one organization to the other.

On the other hand, scholars advocating the benefits of weak ties argue that they provide greater access to novel information than do strong social ties. The underlying premise is that, whereas strong ties are more likely to exist among collectives of familiar people and therefore provide access to knowledge that is probably already commonly known within the collective, weak ties are more likely to span beyond these familiar collectives. Granovetter (1973, 1982) argued that a network of weak ties involving people with whom social interactions are more distal or less frequent would increase access to knowledge that is novel and unfamiliar. Granovetter's (1973, 1982) study of job seekers supported this argument, showing that a network of weak ties provided greater access to new job openings. At the firm level, Uzzi and Lancaster (2003) found that "arm's length" ties (which are theoretically similar to weak ties) are more effective that close ties when it comes to the search, transfer, and exploitation of publicly accessible knowledge. Constant, Sproull, and Kiesler (1996) found that a social connection

to a wide network of strangers was more effective at providing access to technical advice and information. Finally, in their study of social ties in project teams, Levin and Cross (2004) showed that—after controlling for the trust that exists between a knowledge source and receiver—the strength of social ties actually became a liability with regard to the receipt of useful knowledge by the project manager.

Several other elements distinguish social network perspectives. First, most of this research has focused on the flow of easily codified information across social networks (Hansen, 1999). This focus is understandable, given that social network theorists were initially most interested in the power of networks as "monitoring devices," maximizing access to "useful bits of information" (Burt, 1992). A second unique element of social network research is that it has remained agnostic to the content of what actually transfers across ties. The content of what was shared or transferred is often inferred from the outcomes realized by the receiver (for a review see Reagans & McEvily, 2003). Third, while these perspectives focus on the nature of dyadic ties, inherent in the argument for weak ties is the assumption that, because they individually require less effort to maintain, weak ties can be maintained and more easily monitored in greater numbers than can strong ties. Researchers have addressed this complexity directly, either by arguing that the ability of a dyadic relationship to transfer knowledge should be considered in the broader context of the social network that surrounds the source and receiver (Reagans & McEvily, 2003) or by isolating

characteristics of dyadic relationships that transcend the strong versus weak distinction (Levin & Cross, 2004).

Relational characteristics. This branch of network-based approaches to knowledge-sharing research deals with qualities or content of the knowledge shared across dyadic relationships. Research focusing on relational characteristics examines the *usability* of the knowledge to the receiver, a quality to which most other approaches to knowledge sharing and transfer have remained agnostic (Hansen, 1999). This research departs from the strong tie versus weak tie distinction by showing how relational characteristics explain knowledge sharing at the dyadic level. Levin and Cross's (2004) study exemplifies this line of research. They showed that strong ties have a positive effect on the receipt of useful knowledge unless they account for trust, at which point tie strength actually has a negative effect on the receipt of useful knowledge. The usefulness of knowledge sharing in Levin and Cross's study was evaluated in terms of the extent to which the knowledge received contributed to the goals of a team project. In a similar study, Cross and Sproull (2004) delineated several qualities that made shared knowledge more *actionable* from the point of view of the receiver. Their study showed that the level of expertise of the source and receiver contributed to the effective transfer of actionable knowledge. Cross and Sproull defined actionable in this context as contributing to "immediate progress on a current project." Although these studies do not specify who initiates the

knowledge sharing, they share a common emphasis on the value of the knowledge that can be accessed through a dyadic relationship.

A related body of scholarship has approached the question of knowledge sharing from a slightly different perspective, by emphasizing the role of the knowledge seeker in effective knowledge sharing. Borgatti and Cross (2003) evaluated the likelihood of knowledge sharing based on the qualities of the knowledge seeker. Specifically, they found that the likelihood of a person seeking knowledge held by another would increase based on the seeker's ability to identify and access the knowledge held by the source. Similarly, in a study of R&D teams, Hansen, Mors, and Løvås (2005) found that teams were more likely to seek external sources of knowledge when they maintained strong ties to others outside the immediate team. These studies indicated that the initiative of the parties involved (in these cases the knowledge seeker) is an important contributor to effective knowledge sharing.

Social Cognition Approaches

Group information processing. The field of research on group information processing also has yielded important insights into knowledge sharing. Several studies have demonstrated that group members tend to discuss shared or more commonly held information (also referred to as *discussion bias*), causing the group as a whole to fail to leverage information or knowledge that is differentially held by a subset of members (Stasser & Stewart, 1992; Stasser, Taylor, & Hanna, 1989; Stasser & Titus, 1985). Failure to identify these "hidden profiles" is argued

to be due in part to the failure of the group to consider this information, but also to the failure of individuals to introduce or share it in the first place. Research into the conditions that mitigate the discussion bias has shown that groups composed of people who are more familiar with one another are more effective at sharing uniquely held information (Gruenfeld, Mannix, Williams, & Neale, 1996). Thomas-Hunt, Ogden, and Neale (2003) showed that socially isolated members of a group actually would share more knowledge than those who were more socially connected, but that the increased sharing did not improve others' evaluations of them, showing that the relationship between social connectedness in a group and knowledge sharing is more complex than originally believed. Therefore, while a common knowledge bias seems to be a very real element of group information processing, work remains to be done to understand the social mechanisms that mitigate or exacerbate this bias.

Socially shared cognition. Theories of socially shared cognition state that effective information processing in groups requires "collaboration among members who seek to encode, interpret and recall information together rather than apart" (Moreland, Argote, & Krishnan, 1998). For instance, research on transactive memory systems (TMS) in groups has shown that the knowledge held by any one individual can be more effectively applied to the group's collective tasks if the group members divide the cognitive labor for the task, trust in each others' specialized knowledge, are able to coordinate the retrieval and application of individually held knowledge, and share an understanding of who knows what

(Hollingshead, 2001; Lewis, 2003; Wegner, 1986). The performance benefits of TMS have been demonstrated repeatedly in both lab studies (Liang, Moreland, & Argote, 1995; Moreland, 1999; Moreland et al., 1998) and field studies (Austin, 2003; Faraj & Sproull, 2000; Lewis, 2003). In contexts that leverage TMS, knowledge is shared among members in the sense that it is accessible by the rest of the team for the purpose of performing the collective task. In a recent study, Lewis et al. (2005) demonstrated the learning effects of TMS, finding that a developed TMS helped group members to individually and collectively develop the knowledge they needed for the current task as well as transfer that knowledge to other tasks. This work shows that a TMS can facilitate the transfer of knowledge from one task to another similar task.

Shared experience also facilitates more intentional forms of knowledge sharing between group members (Bandura, 1977). For instance, Reagans et al. (2005) found that surgical teams that had more experience working together on the same surgical procedure significantly improved their individual and collective performance on the task, indicative of effective learning. The authors argued that, given the technical nature of the knowledge involved, intentional knowledge sharing between team members must be a critical conduit for learning. While they did not measure knowledge sharing or any other specific learning mechanism, this study is typical of research in this area that takes a black-box approach to how learning actually occurs within a team (Argote, 1999).

Individual Motivational Approaches

Individual willingness to share knowledge is of particular interest to management science and information systems researchers because of its relevance to the success of most knowledge management initiatives. Studies using individual motivational approaches have explored the intersection of individual motivation and knowledge sharing and its impact on the success of technology-based knowledge management initiatives or the effectiveness of technology-mediated collaborations (Kanawattanachai & Yoo, 2007; Yuan, Fulk, & Monge, 2007).

In their study of information systems employees in a variety of Korean firms, Bock et al. (2005) evaluated the impact of individual attitudes, subjective norms, and organizational climate on an individual's intention to share knowledge. Although their study found that attitudinal intention to share knowledge was a predictor of knowledge sharing behavior, their results did not support hypotheses relating individual differences and extrinsic rewards to intention to share knowledge. In a similar study of knowledge workers' contributions to electronic knowledge repositories, Kankanhalli, Tan, and Kwok-Kee (2005) found that individual attitudes towards social interactions were predictive of knowledge contribution to a knowledge repository. Their results did not support hypotheses concerning other aspects of individual expectations regarding the receipt of rewards or reciprocity for their contributions. Finally, a study of contributions to ongoing knowledge management projects found that

social connectedness and centrality in the organization positively related to knowledge sharing, but that individual considerations of reputation and attitude towards helping that might affect motivation to share had no effect on actual knowledge sharing (Wasko & Faraj, 2005). As can be inferred from these findings, compelling support for individual-centered explanations of knowledge sharing continues to elude researchers.

Theory and Definitions

Despite the preponderance of research in the area of knowledge sharing, we still know little about how individuals differ in their willingness to share knowledge with others. This is due in part to the rarity of individual-centered perspectives in knowledge sharing research. For the most part, knowledge sharing research at the individual level of analysis has emphasized how elements of the situation and context surrounding the individual predict motivation to share, leaving to assumption the idea that the individuals involved do not differ in their motivation to share knowledge from the start (Jaarvenpaa & Majchrzak, 2008; Wittenbaum, Hollingshead, & Botero, 2004). A few lines of knowledge sharing research (described above) have explored individual-centered explanations of knowledge sharing, but these studies have been unable to produce compelling support for these explanations (Wasko & Faraj, 2005).

In spite of a lack of evidence supporting individual-centered explanations of knowledge sharing, arguments based on individual-centered considerations of motivation and self-interest are widely employed throughout knowledge sharing

research to gird social or contextual explanations for knowledge sharing but are themselves not explicitly tested. For instance, in their study of knowledge transfer in an R&D firm, Reagans and McEvily (2003) argued that individuals concerned with the threat of their knowledge being more commonly held and less unique are less willing to share their knowledge, because sacrificing control of their unique knowledge to others may make them more redundant and therefore less valuable to the organization. This perspective was also advanced by Gray (2001) in his study of knowledge use in knowledge management projects. Gray argued that encouraging contribution to shared knowledge repositories promoted common knowledge effects and asked people to abdicate control over valued resources, which produced a disincentive to their sharing knowledge. Wittenbaum et al. (2004) echoed this perspective in presenting their theory of knowledge sharing as a deliberate process in which individuals guard their personal goals by hoarding knowledge.

Despite the lack of compelling findings linking individual differences to knowledge sharing, evidence from research on knowledge workers indicates that people may not be equally motivated to share knowledge. In their study of Korean information technology personnel across a wide range of industries, Bock et al. (2005) found that knowledge workers' attitudes towards knowledge sharing predict their self-reported intention to share knowledge with others. The same study, however, failed to find support for the authors' individual-difference based explanations of those attitudes.

Additionally, research has shown that knowledge workers may not share as expected in response to traditionally effective motivators such as rewards for sharing (Wasko & Faraj, 2005) or generalized expectations for sharing (Kankanhalli et al., 2005). Research on contexts that involve knowledge work also suggests that knowledge workers may be more likely to actively hide their knowledge from others when they believe they will benefit by retaining control of their knowledge (Connelly, Sweig, & Webster, 2006). Furthermore, in observations of several knowledge worker organizations, Von Krogh, Ichijo, and Nonaka (2007) observed, "Knowledge workers cannot be bullied into creativity or information sharing; and the traditional forms of compensation and organizational hierarchy do not motivate" (p. 5). Along the same lines, Davenport and Prusak (1998) speculated that, for knowledge workers, sharing knowledge is like engaging in a financial exchange for that knowledge, and that "knowledge workers keep themselves out of the market, because they believe they benefit more from hoarding their knowledge than they would from selling it." Taken together, these findings suggest that, at least among knowledge workers, individual-centered differences may explain the way they consider the implications of sharing knowledge with others and, consequently, their motivation to share. These observations also suggest that prior research might have failed to find effects supporting individual-centered explanations of knowledge sharing, simply because researchers have not accounted for the

unique way in which knowledge workers look at the risks and opportunities involved in sharing knowledge with others.

Identity-Based Explanations of Knowledge Sharing

Recent research on the linkage between personal identity and the willingness of individuals to engage in discretionary behaviors suggests that identity theory may help explain individuals' willingness to share knowledge. Personal identity provides an effective explanation of discretionary behaviors in organizational contexts (Aquino & Reed, 2002; Farmer, Tierney, & Kung-McIntyre, 2003; Seyle & Swann, 2007), and knowledge sharing can be viewed as a special type of discretionary behavior. Personal identity is one of several levels of identity. Individuals construct their identities based upon identities derived from multiple sources, including personal or individual identities, roles and relationships with others, and social categories or collectives (Brewer & Gardner, 1996; Sluss & Ashforth, 2007). Brewer and Gardner presented these sources in terms of levels of identity from which individuals draw in constructing their sense of self. The personal level of identity is composed of those aspects of individual self-concept that differentiate the self from others. At the personal level of identity, individuals focus on themselves as unique beings, evaluating their own traits and abilities (and thereby deriving their sense of self-worth) by comparing themselves to relevant others (Pelham & Swann, 1989).

The potential for an aspect of personal identity to impact individual attitudes and behaviors is well established (Aquino & Reed, 2002; Cheryan &

Bodenhausen, 2000; Shih & Pittinsky, 1999). In their studies of the content of peoples' personal moral identities, Aquino and Reed (2002) demonstrated the potential for individuals' personal moral identities to predict associated judgments and prosocial behaviors. In knowledge worker contexts, Farmer et al. (2003) assessed individuals' beliefs about their own creative self-views and successfully predicted individuals' creative performance in several Taiwanese technical organizations.

Expertise Identity

An underlying premise shared by the studies reviewed above is that, in evaluating the effects of personal identity on behavior, it is most effective to consider those components of personal identity that are closely related to the job or task context in question, because people will tend to behave in accordance with those components of their identity (Brewer & Gardner, 1996; Markus, 1977). Therefore, knowledge sharing may be linked to a component of personal identity related to an individual's expertise. I define *expertise identity*[1] as the extent to

[1] The terminologies used to describe personal identity constructs vary within the identity literature. An abridged approach is to refer to a component of personal identity using only an adjective to describe the particular quality or characteristic associated with that component, such as *moral identity* (Aquino & Reed, 2002) or *creative identity* (Farmer et al., 2003). Another approach is to use the same root terminology just described but with an added qualifier to articulate more precisely the specific dimension of component identity to which the construct refers. The relevant dimension of personal identity in this case is best reflected by the qualifier *importance* or *centrality*, both of which describe the extent to which a person normatively defines himself or herself with regard that quality (Sellers, Rowley, Chavous, Shelton, & Smith, 1997). Therefore, while I continue to use the term *expertise identity*, I am in fact referring to the importance or centrality of expertise identity, and this interpretation should be inferred in all references to the construct.

which an individual defines himself or herself by that aspect of personal identity associated with expertise.

For knowledge workers, it is easy to understand how expertise may come to represent an important component of personal identity. The knowledge emphasis in many modern organizations can underscore the importance that individuals place on the value of their expertise. Contexts that involve knowledge work are unique in that, by definition, the contribution of individuals and the output of the organization are in the form of knowledge-based content or services (Davenport & Prusak, 1998). Knowledge worker industries emphasize individually held knowledge as the primary source of employee and organizational value. Because of this emphasis, knowledge workers are more likely to be conscious of the value they and their knowledge represent to organizations. Knowledge management research has explored the idea that knowledge workers' unique awareness of the value of their knowledge may cause them to be differentially responsive to motivators that might be expected to work effectively in other contexts, such as rewards for sharing and the social capital potential from such exchanges (Kankanhalli et al., 2005; Wasko & Faraj, 2005). These efforts fell short, however, because they failed to provide a compelling account of the qualities of knowledge workers that might cause them to respond differently to these established levers.

Knowledge workers commit much of themselves to the development of expertise and recognize its importance to their professional effectiveness and

image (Davenport & Prusak, 1998). Knowledge workers' accumulation of knowledge in the form of "high degrees of expertise, education and experience" and the effort they make in acquiring and applying that knowledge can become a central component of how knowledge workers define themselves (Davenport, 2005, p. 10). Expertise is often the basis on which people are hired, and their ability to effectively apply expertise in terms of individual performance is often the basis of ongoing evaluation (Nonaka, 1994). For technical and professional organizations in which work is inherently dependent on the effective application of knowledge, individual expertise identity can become salient because of environmental cues in the social context, making it more likely to become a particularly important aspect of individual identity (Abrams, 1994; Forehand, Reed, & Deshpande, 2002). Knowledge workers may wish to avoid sacrificing control over those knowledge resources that they deem vital to extended self-concept and in which they have invested themselves psychologically, much as people develop a sense of ownership over arguments they closely associate with themselves (De Dreu & Van Knippenberg, 2005).

Knowledge sharing between knowledge workers can take several forms. A great deal of research on knowledge sharing between members of continuing project teams is focused on the requirements of integrating individual inputs to a collective effort or advancing the specific goals of a collective project. In the pages that follow, I examine a different form of knowledge sharing in which sharers demonstrate a willingness to pass on their specialized expertise to others by

sharing the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. Expertise is commonly defined as "the knowledge, skills and capabilities people posses as a result of education, experience, and ability" (Van der Vegt, Bunderson, & Oosterhof, 2006). People can help others apply specialized expertise for themselves by sharing a more comprehensive range of procedural techniques, reasoning processes, and personal experience to others. A simple example of the importance of this type of knowledge sharing can be found in a study by Hinds et al. (2001), in which the extent to which people articulated their abstract expertise-based knowledge for another's benefit was predictive of the receiver's ability to successfully apply that knowledge for himself or herself.

Expertise Identity and Knowledge Sharing

In this dissertation, I focus on individuals' willingness to pass on this very comprehensive, expertise-based knowledge to others by sharing the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. This type of knowledge sharing has unique implications for individuals who place greater importance on their expertise identity. First, knowledge sharing is an important way for high-expertise-identity individuals to enact or express that aspect of their identity. By sharing the details of personal techniques, reasoning, and experience, people are able to demonstrate the unique value of their specialized knowledge as well as the breadth and depth of their mastery. However, unlike other forms of identity expression, knowledge sharing also

carries with it the risk of transferring the unique value of that expertise to someone else. Knowledge sharing increases the likelihood that receivers will be able to apply the knowledge or expertise for themselves. The more widely the knowledge or expertise becomes shared, the less it is perceived as belonging solely to the source individual, suggesting the future sharing of that knowledge by the source individual will be less reflective of that person's unique expertise.

In knowledge-intensive organizations, the potential for individually held expertise to become specialized is much greater. The complexity and dynamism of projects in knowledge-intensive organizations often require knowledge workers to modify and adapt their knowledge and expertise, creating new knowledge and expertise. Furthermore, experience at a task may allow a person to develop an advanced understanding of how to approach a task (Hinds et al., 2001). Natural variation in task environments and processes also may prompt individuals to adapt their knowledge of the task or approach the task in an entirely new way (Pentland, 2003). Knowledge acquired from other sources—including coworkers or people and practices outside the organization—may provide new task knowledge that people can use to integrate with or replace existing knowledge (Gray & Meister, 2004; Kane et al., 2005). These individual experiences lead to a situation where knowledge workers' knowledge and expertise becomes highly specialized, creating myriad opportunities for sharing or withholding unique knowledge and expertise.

Knowledge workers' willingness to pass on their specialized expertise to others can be evidenced in terms of the extent to which they are willing to share the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. These characteristics not only form the basis of how individual knowledge is differentiated from commonly held knowledge or procedures, but also reflect established means by which complex knowledge is effectively communicated (Borgatti & Cross, 2003; Cannon-Bowers, Salas, & Converse, 1993; Gray & Meister, 2004; Zhong & Majchrzak, 2004). These indicators are described below:

1. Providing elaborated explanations involves describing in detail how to execute procedures, providing details that circumscribe when and where a procedure or technique may be applied, or pointing out aspects of the procedure or technique that experience has shown to be problematic (Zhong & Majchrzak, 2004).

2. Describing reasoning involves sharing insights, reasoning, and rationale that a person employs in his or her work. In many respects, this is similar to people sharing aspects of their mental model or thinking processes that guide their effective application of knowledge and procedures (Cannon-Bowers et al., 1993).

3. Relaying personal experience involves describing the behaviors, choices, and trial-and-error experiences that were a part of one's personal learning process. This includes one's own vicarious learning (Bandura, 1977) as well as

external sources of knowledge and learning upon which one drew (Borgatti & Cross, 2003; Gray & Meister, 2004).

Throughout this dissertation, I suggest that the *willingness to share knowledge* construct is discretionary in nature. As such, a brief discussion of my basis for this claim is warranted. First and foremost, the construct is designed to reflect a willingness to share knowledge that is above and beyond that required to successfully perform the specified work – a key characteristic of established discretionary behavior constructs. In this case, the construct is designed such that people can perform just as well on the task at hand and in collaboration with others without sharing knowledge in the manner described by the willingness to share knowledge scale, nor would withholding knowledge on any of these items undermine others' or collective performance. Rather, the types of knowledge reflected in the scale items are drawn from theories of elaborated communication (Zhong & Majchrak, 2004) and communicated reasoning (Borgotti & Cross, 2003; Cannon-Bowers et al, 1993), both of which reflect discretionary means of communicating individually-held, non-codified knowledge. The discretionary quality of this type of knowledge sharing is particularly relevant in this study because it reflects people's motivation to share knowledge apart from the specified requirements of the work at hand. This willingness to share knowledge construct is unique even among related constructs of discretionary behavior in that it is only reflective of individual discretion and not dependent upon individual intention to improve the welfare of others or the organization. In this

way, the measure demonstrates parsimony in design that is desirous in newly minted measures (Spector, 1992). The internal consistency of the measure is reflected is the extremely high Cronbach's alpha (.91), supporting the premise that all items are measuring the same underlying construct. Finally, I attempted to validate the *willingness to share knowledge* scale and its discretionary quality in a pre-test analysis, in which I compared the scale to established, worked-related scales of knowledge sharing. A snowball sample of 65 knowledge workers was asked to evaluate a team member on the *willingness to share knowledge* scale items intermixed with two items from an established measure of work-related knowledge sharing (i.e. knowledge sharing that would be expected in the normal performance of specified work; Bock et al, 2005). Using procedures outlined by Campbell and Fiske (1959), I compared the inter-measure convergence to the within-measure convergence. This calculation yields a ratio statistics for evaluating discriminant validity; any ratio below the .85 threshold indicates that the two scales measure theoretically different constructs. My calculation returned a value of .56, which is well below the .85 threshold for determining discriminant validity.

In developing predictions about how expertise identity will affect knowledge sharing, multiple theories of identity and identity-motivated behavior can be brought to bear. However, as I argue in the pages that follow, when taken together these identity theories do not lead to a single, dominant prediction regarding the effects of expertise identity on knowledge sharing. Rather, they

indicate that expertise identity will have either a promotive or an inhibitive effect on willingness to share knowledge, contingent upon the influence of other factors. I draw on the theories of self-verification theory, optimal distinctiveness, self-enhancement, and social comparison to demonstrate how some identity theories make conjoint predictions that are either promotive or inhibitive, contingent upon other characteristics of the individual or situation. I describe the theoretical bases for these contingent interpretations in the next subsection.

Self-Verification and Expertise Identity

Self-verification theory states that people want others to see them as they see themselves (Swann, 1983). There is significant empirical support for self-verification effects in people's interactions, even when people's self-views are negative (for a review see Seyle & Swann, 2007). Similar arguments support the effects found for the link between identity and discretionary behaviors such as moral decision making (Aquino & Reed, 2002) and creative work (Farmer et al., 2003). Knowledge sharing is an effective means by which people give others a window into their own expertise and bring others to see them as they see themselves: as possessing expertise. For people who place greater importance on their expertise identity, sharing knowledge with others is an important mechanism by which they demonstrate their expertise to others, expressing that aspect of their identity and thereby bringing others to see them as they see themselves. In this manner, self-verification theory suggests that high-expertise-identity individuals will be more willing to share knowledge. Research also has

shown, however, that people actively will seek and maintain self-verifying interactions and avoid those that are not self-verifying (Swann & Pelham, 2002) or that risk producing information that is inconsistent with or has negative implications for personal identity. Therefore, in certain interactions, such as when knowledge receivers may be more likely to criticize or undermine the knowledge source and his or her expertise, a knowledge source who places great importance on expertise identity may refrain from sharing what they know in order to avoid engendering responses and perceptions that are inconsistent with their personal identity (Seyle & Swann, 2007). Furthermore, high-expertise-identity individuals are likely to avoid sharing knowledge in interactions that are *not* self-verifying, such as when there is the risk that doing so may bring others to see them in ways that are inconsistent with their identity. This may occur, for instance, when knowledge sharing is not well received, such as when receivers do not have the expertise to understand the knowledge being shared (Hinds et al., 2001) or when knowledge sharing is seen as superfluous compared to more critical performance goals (Bunderson & Sutcliffe, 2003). It appears, therefore, that self-verification theory predicts greater knowledge sharing on the part of high-expertise-identity individuals when they expect that such interactions effectively will verify their identity and less knowledge sharing when they expect that such interactions will be less likely to verify their identity.

Optimal Distinctiveness and Expertise Identity

Contingent predictions also can be gleaned from optimal distinctiveness theory. As Brewer (1991) described in her seminal work on identity, people will be motivated to maintain a balance between those qualities they share with others in their social group and that form the basis of their shared identity and those qualities they possess uniquely and that distinguish them as individuals. In asserting their individual distinctiveness, people will be more likely to emphasis those qualities that are important to their personal identity (Brewer & Gardner, 1996; Vignoles, Chryssochoou, & Breadwell, 2000). For people who place greater importance on their expertise identity, sharing knowledge with others is a means of asserting individual distinctiveness. Sharing knowledge allows individuals to demonstrate the unique aspects of their experience, knowledge, and expertise to others, differentiating them from others and thus effectively demonstrating the distinctiveness of their expertise and asserting their expertise identity.

Optimal distinctiveness theory also explains that people will be motivated to maintain those qualities that are the source of their individual distinctiveness. As discussed earlier, because increased knowledge sharing has the potential to transfer knowledge more effectively to others, it increases the risk that more people then will master similar knowledge and reduce the distinctiveness of the particular expertise (Jaarvenpaa & Majchrzak, 2008). For people who are high in expertise identity, knowledge sharing also runs the risk of diluting their principle basis of individual distinctiveness. For these individuals, knowledge sharing is

both an important means of asserting individual distinctiveness and an opportunity to compromise individual distinctiveness. It stands to reason that individuals will weigh the implications of sharing knowledge based on qualities of the situation that influence the relative opportunity and risk.

Self-Enhancement and Expertise Identity

The theory of self-enhancement is closely related to the theories described above and can be interpreted also to make contingent predictions with regard to the relationship between expertise identity and knowledge sharing. According to self-enhancement theory, people are motivated to present themselves in as positive a light as possible as a means of protecting and enhancing self-esteem (Gecas, 1982; for a review see Vignoles, Regalia, Manzi, Golledge, & Scabini, 2006). The motivation to self-enhance influences how people approach situations and opportunities that are expected to have implications for the self, suggesting they will prefer opportunities to gain positive information about the self and avoid those opportunities that may have unfavorable implications for the self. This suggests that people who place a high degree of importance on expertise identity will be more likely to share knowledge when doing so has positive implications for self-esteem, such as when they feel they will be more able to demonstrate their expertise to others by sharing their knowledge. Similarly, people who place greater importance on expertise identity will avoid sharing knowledge if doing so involves a greater risk of sacrificing control of that knowledge to someone else who may use it towards their own means, suggesting

the original source of the knowledge will be less able to rely on unique control of that knowledge to gain positive information about the self in the future. In this way, self-enhancement predicts that high-expertise-identity individuals will be more likely to share knowledge in some situations and less likely to share in others.

Social Comparison and Expertise Identity

Underlying the arguments presented based on optimal distinctiveness theory and self-enhancement theory is social comparison theory (Festinger, 1954), which says people will be motivated to enhance their self-esteem by making positive social comparisons with others. This theory suggests that individuals with strong expertise identities are more likely to compare themselves to others based on expertise. Expertise is also a meaningful basis of interpersonal comparison because its effects are objectively observable by means of its causal relationship to individual task performance (Pemberton & Sedikides, 2001). People who place greater importance on expertise identity are motivated to acquire expertise, realizing increased task effectiveness and more favorable social comparisons with others as a result (Sedikides, 1993). People also are motivated to maintain sources of their ability to make positive social comparisons (Rijsman, 1974), meaning that people who place importance on expertise identity tend to refrain from sharing knowledge because it increases the likelihood that others will be able to effectively employ similar expertise, reducing the sharer's ability to make positive social comparisons based on that expertise going forward. In this

manner, sharing knowledge with others also may undermine one's ability to make positive social comparisons because it reduces the extent to which the sharer controls unique knowledge resources (Gray, 2001). To the extent that others control similar knowledge resources, an individual may feel he or she is more redundant with others in the organization based on expertise and is less able to make positive social comparisons based on expertise. Therefore, given that individually held knowledge and experience are the source of positive interpersonal comparisons of expertise, individuals who place more importance on expertise identity may be less willing to share this knowledge and experience with others.

Summary: Contingent Effects of Expertise Identity

As mentioned earlier, interpretation of these identity theories does not lead to a single, dominant prediction regarding the effects of expertise identity on knowledge sharing. Instead, the theories evoked above—self-verification, optimal distinctiveness, self-enhancement, and social comparison—suggest that expertise identity will have either promotive or inhibitive effects on sharing based upon the presence of a third factor, such as the nature of the social relationship in which these behaviors are considered. Reconciling these contingent predictions requires a broader consideration of the individual and situational characteristics that may impact how and when personal identity manifests in individual behavior. In the next section, I focus on how these third factors interact with expertise identity to explain how expertise identity affects knowledge sharing. Specifically, I argue

that expertise identity will impact knowledge sharing, contingent on other identity, social, and work environment influences. The influences considered are drawn from existing areas of identity and knowledge sharing research. These influences are outlined below, along with the rationale for their anticipated influence on the effects of expertise identity:

Other facets of the self. It is well established that personal identity is only one of several relevant types of identity and self concept (Brewer & Gardner, 1996). Considering how a component of personal identity interacts with other aspects of the individual self can improve understanding of identity-motivated behavior.

Dyadic social relationships. Not only are one's relationships an important conduit for identity enactment and self-verification (Seyle & Swann, 2007), but the knowledge-intensive nature of knowledge worker interactions is especially likely to be relevant to individuals' expertise identity (Edmondson, 1999; Levin & Cross, 2004).

Social identification. The extent to which one identifies with team membership and feels connected to others on the team has been shown to impact the transfer of knowledge in teams (Kane et al., 2005) and should have a significant impact on the extent to which an individual feels safe and validated, expressing his or her personal identity through knowledge sharing.

Characteristics of the work environment. Situational cues have been shown to have a strong impact on the relative salience of various aspects of

personal identity (Farmer et al., 2003). Work environment is explored in terms of an organization's learning orientation, which is an indicator of how people in the organization value learning behaviors. The extent to which people perceive that their organization values learning should influence their expression of expertise identity by way of knowledge sharing.

Hypotheses

I present the hypotheses in this section by describing how each contingency factor may moderate the effect of expertise identity on willingness to share knowledge. Therefore, the primary hypotheses are all articulated in terms of interaction effects.

Other Facets of a Person's Self

General self-efficacy. A person's general self-efficacy is a stable, trait-like belief in his or her own competence (Bandura, 1994; Chen, Gully, & Eden, 2001). General self-efficacy is distinct from task-specific self-efficacy, which is a belief about one's ability to perform a defined task. General self-efficacy has been studied in numerous areas of organizational research, and its link to individual performance has been demonstrated consistently (Chen et al., 2001; Judge, Shaw, Jackson, Scott, & Rich, 2007). General self-efficacy also affects the attributions people make about their own performance (Bandura, 1997). For instance, people with high general self-efficacy are more likely to attribute their success to personal ability, while attributing failures to factors outside their

control, such as job conditions. General self-efficacy also affects people's expectations of the outcomes they will be able to achieve (Kozlowski et al., 2001).

Assessing the influence of self-efficacy in concert with other aspects of individual differences and self-concept has been shown to significantly improve its ability to predict work-related performance (Judge et al., 2007). Findings from a study by Kankanhalli et al. (2005) showed that an individual's specific self-efficacy in the domain of knowledge application has a positive effect on employees' contribution to knowledge management efforts. This suggests that self-efficacy alone may not yield effective explanations of knowledge sharing but should be considered in terms of how it affects the relationship between expertise identity and knowledge sharing.

I argue that people with a strong expertise identity who also have a higher sense of general self-efficacy will be more likely to believe that their knowledge sharing efforts will result in the goals they seek (Bandura, 1994; Bandura & Locke, 2003), namely to assert and verify their expertise identity. People with a strong general self-efficacy will have greater confidence in their ability to effectively apply the knowledge they possess. People with strong expertise identity have a greater confidence in their ability to share their expertise in such a way that brings others to recognize their expertise (Lin, 2001), thus verifying that aspect of their identity (Swann, 1983).

Conversely, people who place greater importance on expertise identity but are low in general self-efficacy may have the same desire to verify their identity

by sharing knowledge, but because they lack confidence in their ability to effectively apply their expertise to solving job-related problems (Constant et al., 1996) or improving work efficiency (Baer & Oldham, 2006), they may not have much confidence that others will perceive them as having expertise. People with a strong expertise identity who are also low in self-efficacy may doubt their ability to effectively communicate or assert their expertise, which means that trying and failing to effectively share knowledge could have the opposite effect of creating negative perceptions of the source's expertise. Such individuals are more likely to expect that their efforts will fail to create the perceptions they desire in others (DeRue & Moregeson, 2007) and therefore are more likely to believe that sharing their knowledge only will undermine others' perceptions of their expertise, resulting in failure to self-verify that aspect of their identity. Awareness of this risk may cause such individuals to refrain from knowledge sharing rather than risk negative feedback to their expertise identity.

Finally, for people who place less importance on expertise identity, the effects of their general self-efficacy on the relationship between expertise identity and knowledge sharing will be much weaker, if not negligible. These individuals will be much less likely to assert or verify their identity by means of knowledge sharing, which means if self-efficacy has any effect on behavior, it will not be in this capacity.

Hypothesis 1. Therefore, Hypothesis 1 is the following: The strength of individuals' expertise identity will interact with their general self-efficacy in

predicting knowledge sharing, such that people with strong expertise identity will be more likely to share knowledge when general self-efficacy is high but less likely to share when general self-efficacy is low. For people with low expertise identity, the effects of self-efficacy will be negligible.

Dyadic Social Relationships

Given the central role that dyadic social relationships have played in knowledge sharing research to date, two different relational characteristics will be considered here. One—trustworthiness—is drawn from research on the specific characteristics of social ties that explain knowledge sharing (Levin & Cross, 2004). The other—receiver expertise—is drawn from the body of research on the importance of characteristics of the individuals involved in the knowledge sharing relationship.

Receiver's perceived trustworthiness. Trust is defined as the "willingness of a party to be vulnerable" (Mayer, Davis, & Schoorman, 1995, p. 712). The perception that another individual can be trusted (also referred to as the perception of *trustworthiness*) is the willingness of the trusting party to be vulnerable in his or her interactions with the trusted individuals. The extent to which expertise identity affects the willingness of one individual to share knowledge with another will depend on the extent to which the knowledge source trusts the individual with whom he or she is sharing. Willingness to be vulnerable in knowledge exchange equates to individuals' belief that they may share knowledge and ideas openly without fear of embarrassment, rejection, or

criticism. A large body of trust research shows that greater relational trust between parties leads to greater knowledge exchange (Andrews & Delahay, 2000; Penley & Hawkins, 1985; Tsai & Ghoshal, 1998).

More recently, a study by Levin and Cross (2004) showed that relational trust fully mediates the positive relationship between relational tie strength and effective knowledge exchange. For people with a strong expertise identity, the vulnerability experienced by the knowledge source as a result of relational trust provides a context in which people are more willing to express and self-verify the important aspects of their personal identity. Trust and respect between individuals creates an environment in which people are "comfortable being themselves" (Edmondson, 1999, p. 354). This suggests that people who place great importance on expertise identity will be more willing to express and self-verify that aspect of their identity by sharing knowledge when interacting with people they trust.

For people with high expertise identity, a lack of trust and willingness to be vulnerable with regard to the receiver will cause people to withdraw or withhold that aspect of their personal identity by refraining from sharing knowledge. People will be less willing to expose those important aspects of themselves to critical, contradictory, or negative self-verifying interactions. For instance, when a person shares knowledge and it is met with criticism, disdain, or disregard, the negative implications for the self are much greater when that person places a great deal of importance on expertise identity. Negative

responses are significantly more likely in interactions with others who are not trusted. There is also a greater risk that others who are not trusted will take credit for the knowledge themselves or apply the knowledge in a way that undermines the sharers' interests (Levin & Cross, 2004), with obvious negative implications for the sharers' expertise identity and distinctiveness. Therefore, in interactions with people who are not trusted, people who place importance on expertise identity will be less likely to share knowledge than people who place less emphasis on expertise identity. In other words, whereas anyone is likely to respond to a lack of trust by sharing less knowledge, those who place greater importance on expertise identity will be even less likely to share in such relationships.

Hypothesis 2. The strength of individuals' expertise identity will interact with their trust in receivers to predict knowledge sharing, such that individuals with strong expertise identity will be more likely to share knowledge when trust in the receiver is high but less likely to share when trust in the receiver is low. For people with low expertise identity, their willingness to share knowledge still will be affected by trust, but to a much lower degree.

Receiver's level of expertise. Knowledge worker organizations often employ people with widely differing levels of expertise. Organizations can benefit from this diversity when individuals are willing to provide their unique knowledge and experience to others (Reagans et al., 2005), but diversity in knowledge and expertise can complicate knowledge sharing (Van der Vegt et al.,

2006) and effective knowledge transfer (Hinds et al., 2001). Research on expertise diversity also has shown that a person's willingness to help others may be heavily influenced by the level of expertise of the person with whom he or she is interacting (Van der Vegt et al., 2006).

I propose that a person's expertise identity and the degree of perceived expertise of the person with whom he or she is interacting jointly will predict knowledge sharing. People who are recognized as having high levels of expertise are assumed to possess superior knowledge and skills, which limits their dependencies on others in the group (Van der Vegt et al., 2006). People with higher levels of expertise are also better able to evaluate and critique the knowledge contributions of others (Ehrlich, 2003). As a result, people who place greater importance on expertise identity will be more inclined to share knowledge with people who possess higher levels of expertise as a means of verifying that identity. For people with high expertise identity, such interactions would have positive implications for their identity continuance and self-verification efforts. Furthermore, people with high expertise identity are more likely to see other highly expert people as relevant sources of social comparison (Tesser, 1988), making them more germane as exchange partners who are in position to validate identities and return the knowledge sharing effort by means of future social exchanges (Blau, 1964).

People who place greater importance on expertise identity, however, will be less concerned with the potential risks of sharing knowledge with people who

are low in expertise. Such exchanges offer little in the way of verifying or social capital opportunities, since people who are low in perceived expertise will be seen by high-expertise-identity individuals as being less relevant bases of social comparison (Pemberton & Sedikides, 2001). Conversely, people who place little importance on expertise identity will be less concerned with the risks and opportunities to identity associated with sharing knowledge. They therefore will be more likely to share knowledge with others whom they perceive to place a similar emphasis on expertise, including receivers they perceive to be low in expertise.

Hypothesis 3. The strength of a knowledge source's expertise identity will interact with receivers' level of expertise in predicting knowledge sharing, such that knowledge sources with strong expertise identity will be more willing to share knowledge with high-expertise receivers while also being less likely to share knowledge with low-expertise receivers. Conversely, knowledge sources with low expertise identity will be more willing to share knowledge with low expertise receivers.

Social Identification

Team identification. Social identification is defined as the extent to which an individual perceives belonging to a group or category of individuals (Ashforth & Mael, 1989). In an organization, people may come to identify with a social category (such as ethnicity), a collective (such as a workgroup or team), or an organization as a whole. Individuals who identify strongly with a social group will

be more likely to define themselves in terms of the qualities that distinguish that social group (Pratt, 1998; Tajfel & Turner, 1979). Strong social identification can lead to positive self-esteem; behaviors consistent with the social identity; positive feelings towards the social group; and feelings of liking, cohesion, cooperation, and altruism towards other members of the social group (Ashforth & Mael, 1989). Organizational identification has been linked to numerous positive organizational outcomes, including lowered turnover intentions (Tyler & Blader, 2000), extra-role behavior (Dukerich, Golden, & Shortell, 2002; Tyler & Blader, 2000), job satisfaction (Van Knippenberg & van Schie, 2000), and knowledge transfer (Vora & Kostova, 2007).

The strength of a person's identification with his or her team will determine whether expertise identity has a positive or negative effect on knowledge sharing. In particular, people who place greater importance on expertise identity and also have a strong sense of social identification with their team will be more likely to engage in knowledge sharing with other members of their team. Feelings of connectedness and cooperation associated with strong team social identification will prompt people to actively consider ways their own knowledge and experience may help others in the team and to be proactive in sharing their knowledge and experience. This is consistent with the well-established premise in social identity research that workgroup members who share a social identity will be more likely to engage in cooperative, extra-role, and discretionary behaviors that will benefit other members (for a review see Tyler &

Blader, 2000). Specifically with regard to knowledge sharing, a related study has shown that people are more likely to share their thoughts and opinions with others in their workgroup when they share a social identity (Philips, Neale & Liljenquist, 2003). People also will be more comfortable enacting strong aspects of their personal identities in the presence of others to whom they feel connected (Polzer, Milton, & Swann, 2002; Swann, Milton, & Polzer, 2000) and will be more motivated to self-verify their personal identities in relationships with others to whom they are close and connected (Seyle & Swann, 2007). The strength of interpersonal connections that exists when team identity is strong suggests that people with strong expertise identity will engage in greater knowledge sharing as a way of enacting and self-verifying their identities in such contexts. Furthermore, the feelings of belonging associated with strong team identity should make people with strong expertise identity less concerned with maintaining unique sources of knowledge that distinguish them from others in the group (Brewer & Gardner, 1996). Therefore, people with strong expertise identity will be more likely to enact that identity by sharing knowledge when they also have a greater degree of team identification.

For people with strong expertise identities, low team identification will cause them to be less inclined to define themselves based on their membership with the relevant social category. Positive feelings for and connectedness to fellow members of the group will be generally lower as well. Such people will be more inclined to see themselves as unattached to team members and, as a result, will

be less inclined to enact or self-verify their identities through their interactions with others. This suggests people with a strong expertise identity will be less inclined to share knowledge in a context of low team identification. Furthermore, people with low team identification are more likely to see themselves as free agents, motivated more by self-interest considerations (Brewer & Gardner, 1996). People with strong expertise identity will be more motivated to preserve those aspects of personal knowledge and experience that distinguish their expertise and undergird the distinctiveness of their expertise identity, making them more inclined to withhold knowledge sharing, which could undermine that distinctiveness within the team. When team identification is low, people will feel less of a sense of in-group safety (Kane et al., 2005), making them more concerned with the potential for negative self-verification.

Hypothesis 4. The strength of individuals' expertise identity will interact with their degree of team identification in predicting knowledge sharing, such that people with strong expertise identity will be more likely to share knowledge when team identification is high but less likely to share when team identification is low. People with low expertise identity still will be more likely to share when team identification is high but to a lesser degree.

Characteristics of the Work Environment

Organizational learning orientation. Bunderson and Sutcliffe (2003) described a learning orientation as "an emphasis on the development of skill, knowledge, and competence" that involves "learning oriented behaviors among

members" (p. 552) and demonstrated its positive contribution to collective performance. A workgroup's orientation can have a profound impact on the behavior of individual members, cueing them that certain behaviors are more highly valued than others, resulting in an increase in those behaviors (Abbey & Dickson, 1983; Amabile, 1988).

A strong learning orientation will have meaningful implications for people who place a high importance on their expertise identity. The importance of a person's expertise identity and the strength of an organization's learning orientation should interact to predict higher levels of knowledge sharing. A learning-intensive environment increases the likelihood that a person who places importance on expertise identity will have the opportunity to self-verify through their interactions with other individuals (Swann et al., 2000). A similar interaction effect was found in a study by Farmer et al. (2003), who demonstrated that creative self-views and organizational valuing of creativity interacted to predict higher creative behaviors.

When an organization's perceived learning orientation is weak, people who place greater importance on expertise identity will be more likely to refrain from knowledge sharing. Knowledge sharing in an environment that does not emphasize learning not only will fail to verify a high expertise identity individual, but also will incur negative responses from other members who may see such behaviors as superfluous, distracting, or counterproductive. Furthermore, a low learning orientation is often the result of a commensurate emphasis on

performance (Bunderson & Sutcliffe, 2003), causing people to be more concerned with their own performance and less with engaging in learning behaviors that may be seen as superfluous to the performance goal. Such an emphasis on individual performance could cause members to refrain from sharing knowledge in order to focus their abilities to achieving positive social comparison through their own performance (Pemberton & Sedikides, 2001).

Hypothesis 5. The strength of individuals' expertise identity will interact with their perception of the organization's learning orientation in predicting knowledge sharing, such that individuals with strong expertise identity will be more likely to share when learning orientation is strong but less likely to share when learning orientation is weak. People with low expertise identity still will be more likely to share when learning orientation is high but to a lesser degree.

Knowledge Sharing and Learning

The potential benefit of knowledge sharing is that it can help others learn, either as a complement to or a substitute for other forms. I define learning outcomes as the changes that take place in a person's approach to work as a result of interactions with another person, as described below (Gray & Meister, 2004). These learning outcomes are articulated in three distinct forms: (a) *replicative,* or making incremental improvements in the understanding or application of established work knowledge and procedures; (b) *adaptive,* or adopting updates or revisions to work knowledge and procedures, including new procedures or routines; and (c) *innovative,* or generating new ways of applying or thinking

about work knowledge and procedures. Knowledge sharing can facilitate all three forms of learning outcomes. The link between greater knowledge sharing and each of these learning outcomes is addressed in kind.

Replicative. First, knowledge sharing promotes replicative learning outcomes because it allows people to benefit from the experience of others in the workgroup who are applying similar knowledge and procedures. Individuals working repeatedly on the same types of tasks have the opportunity to experiment with different ways of approaching established routines and procedures. This trial-and-error experience yields important knowledge about which approaches are more effective and which are not. When people share this knowledge, it allows others to benefit from their experience. People receiving this knowledge are able to use this trial-and-error experience to guide their own performance, avoiding potential pitfalls and more quickly selecting effective approaches. Therefore, sharing knowledge in the form of a source relaying the details of personal experience should allow others to more rapidly acquire and improve task procedures, which is the essence of replicative learning outcomes. The benefits of having access to others' personal knowledge through effective transfer have been demonstrated in terms of contributing to replicative learning outcomes (Reagans et al., 2005). In this way knowledge sharing promises to have a positive effect on replicative learning outcomes.

Adaptive. As the task environment changes—for example, as a result of changes in company goals, competition, or technology—knowledge workers are

often faced with the need to make dramatic changes to established routines and procedures. People may make such changes by adopting new task procedures from others or by acquiring new task procedures through training, education, or independent sourcing (Gray & Meister, 2004). Knowledge sharing provides a means by which knowledge workers can be introduced to potentially superior changes in expertise, facilitating adaptive learning outcomes. Research has demonstrated the potential for effective knowledge transfer within workgroups to lead to the adoption of superior routines—an adaptive learning outcome—and improved performance (Kane et al., 2005). However, we still know little about how knowledge sharing contributes to this type of transfer.

Innovative. Third and finally, knowledge sharing is a critical input to innovative learning outcomes by facilitating emergent combinations of existing knowledge and diverse perspectives. Emergent combinations of existing knowledge are those innovations that result from making new connections between "existing but previously unconnected ideas" (Hargadon & Sutton, 1997, p. 716). This may involve an innovation as simple as applying an existing procedure in an entirely new context, or it may involve combining elements from multiple existing procedures to produce an entirely new procedure, all of which constitute innovation (McFadyen & Cannella, 2004; Nonaka, 1994). Sharing knowledge about specific procedures and the rationale involved in applying them promises to facilitate individual innovative learning outcomes by enabling people to draw on a broader base of knowledge in making emergent connections and

combinations. Additionally, being exposed to differing viewpoints has been linked to creative and innovative outcomes in groups (Bantel & Jackson, 1989). By exposing individuals to different viewpoints and perspectives, knowledge sharing has the potential to facilitate individual innovative learning outcomes.

Hypothesis 6. Taken together, these learning outcome arguments lead to the following hypothesis: There will be a positive relationship between the willingness of a source to share knowledge with a receiver and the learning outcomes (replicative, adaptive, and innovative) realized by the receiver.

CHAPTER 3: METHODOLOGY

In this chapter, I describe the study designed to test the research questions outlined in chapter 2. My principal research goal was to test the extent to which willingness to share knowledge with others can be explained as a function of an individual's expertise identity. I argue that, due to a complex constellation of implications drawn from personal identity theories, the effects of expertise identity on willingness to share knowledge is contingent upon other factors, namely other facets of the self, dyadic social relationships, social identification, and characteristics of the work environment. I presented specific hypotheses for each of these contingencies.

I selected a field study design to test the relationships hypothesized in this dissertation. This choice was driven in large part by the nature of the expertise identity construct, which I argue is a component of personal identity that is particularly salient in contexts that are knowledge intensive. Conducting research in a natural context that is knowledge intensive provided two additional benefits. First, individual experience varies widely in natural field settings, allowing specialization in knowledge among employees to develop naturally, increasing the richness and generalizability of findings regarding knowledge sharing. Second, a field setting allowed me important opportunities to validate key constructs and measures in a real knowledge-intensive organization, thereby enhancing external validity. The field study was comprised of a cross-sectional

survey utilizing round-robin ratings provided by knowledge workers about their peers within continuing teams.

To analyze the survey data, I used a specific application of multilevel modeling called the social relations model (Kenny, 1994; Snidjers & Kenny, 1999). This approach was ideally suited to the dyadic nature of the data and the dependent variable: one person's perceptions of another's willingness to share knowledge. A source individual's willingness to share knowledge would be evaluated by each member of the team, who would be designated the receiver of that knowledge. The social relations model allowed me to test hypotheses involving qualities of directional, dyadic relationships. Alternative techniques would require aggregation of the multiple assessments made of a focal individual, masking potentially important variance.

Setting

I conducted the field study within a leading, national, civil engineering firm. The firm had roughly 500 employees at the time of the study and is based in the southwest United States with offices in five other states around the country. The company specializes in the execution and delivery of complex projects evaluating specific problems in the area of civil engineering. For example, one of the firm's recent projects was to develop a dynamic water runoff and recharge model to assess the impact of a multiacre development on the water table. The firm is well established in the field. In 2008 the firm was ranked 176 out of the

top 500 design and engineering firms in the United States, according to *Engineering News-Record*.

The nature of the firm and its work makes it an excellent environment in which to study the relationships hypothesized in this dissertation. First, employees have developed expertise in the area of civil engineering based on years of secondary education, professional training, certification, and experience. Second, the design of employees' work gives them significant opportunities to apply and develop their expertise independently, as they often work alone in dynamic problem environments before integrating their work with the team's. Engineers undertake elements of the project work independently. Once these independent components of the project are completed, employees bring the output of their work back to the team to integrate it with other members' work to produce project deliverables. This context allows for a greater degree of specialization in personal job knowledge and expertise among employees as individuals develop and maintain unique approaches to their independent work. However, team members also have common goals that require interdependence and effective collaboration. Third, the firm's stable workgroup structure makes it an excellent environment in which to study knowledge sharing in teams. There is essentially no member rotation between teams. When someone is hired into the firm, he or she joins a team and stays with that team until leaving the firm (in all but the rarest cases).

This study had the support and active involvement of the chief executive officer (CEO) and several members of the senior management team, including the chief financial officer, the director of human resources (HR), and the director of marketing. Their support insured the successful implementation of the study. First, the involvement and support of the leadership team allowed me to explore in detail the structure and work of teams in this organization, allowing me to design the most appropriate empirical methods and techniques for the context. I was also able to work with this group to evaluate the validity of several of the measures I was planning to use in the study, most importantly by making sure that the language used in the items would make sense to employees of this organization. (It should be noted that this particular group was not included in the final sample.)

Second, the involvement and support of the leadership team allowed me to secure a high level of buy-in, participation, and presence from each location's leadership and employees. For example, I was able to visit most of the firm's locations personally. As a scheduled part of each office's monthly staff meeting, I was introduced by the CEO or office director to the employees as a group and given an opportunity to provide an overview of the study, describe the goals of the project, and answer any questions they might have about the study. I then hand-delivered the survey packets to the office administrator who was responsible for distributing them to employees. The locations I was unable to visit personally account for fewer than 5% of the company's employees. In these

cases, individual survey packets were mailed to each employee at the office with the same preposted, return-addressed envelope. The benefits of these personal contact efforts are reflected in the high response rate realized (55% of employees surveyed responded).

Power

In advance of the study, I conducted a prospective Cohen's power analysis using Lenth's (2006) power analysis software. Calculations were made based on an anticipated effect size of .15, an alpha of .05, 15 regressor variables (6 independent variables, 5 interaction terms, and 4 control variables), and a target power value of .85. This analysis suggested that a sample size of 150 individuals would be required for the study. I determined that this would be easily achievable in the planned field study, assuming a reasonable 30% response rate from a total sample pool of 500 employees at the target firm. This approach to power analysis can be effectively used in evaluating requisite sample size for a two-level multilevel modeling technique, such as in social relations modeling.

Procedures

I designed the survey used in this study to accomplish two objectives. My primary objective was to capture the data necessary to test the relationships in this dissertation. The secondary objective was to help answer questions the firm had about employee perceptions of company values. This secondary objective was a condition of my access to the firm and its employees. I worked closely with the firm's leadership and HR staff to maximize the effectiveness of the survey

questions and formats that would be employed towards my research goals. Namely, I wanted to make sure that the wording of questions and instructions would be interpreted correctly by employees and that the design format for the round-robin ratings was optimally accessible to employees. I also worked with the firm's leadership to develop a handful of questions about employees' understanding of and agreement with firm values. These latter questions were placed at the end of the survey in order to reduce the likelihood that they might influence participants' answers to the central research question in this study. The client was aware that answers to such values questions might be influenced by earlier questions in the survey but were willing to tolerate this as an acceptable consequence of my conducting the study.

I prepared individual survey packets addressed to each employee. Each packet contained an introductory letter explaining the project and procedures, a paper-and-pencil survey with a cover page of instructions, and a prestamped return envelope addressed to me as the project administrator. Allowing employees to mail their responses directly to me via U.S. postal service insured that individual responses were kept secure and confidential in accordance with the specification of human subjects research pertinent to this type of study. I selected the paper-and-pencil format based on input from the firm's management suggesting that this format would maximize perceptions of confidentiality and avoid potential concerns employees might have regarding the security of alternative forms—namely Web-based forms—of survey administration.

Surveys were delivered to employees at their desks, either hand-delivered by the office administrator or mailed directly to the employee. The introductory letter instructed employees to complete the survey at their desk during company work hours. This request was echoed in an e-mail from the company's CEO, who repeated these instructions, made it clear that completing the surveys would count as time on-the-job, and emphasized the importance of the project. The survey itself included a mix of open-ended responses, scale items, and round-robin ratings of team members. On the round-robin questions, each survey provided a grid on which respondents were asked to write in the names of their fellow team members and answer the corresponding scale items with regard to each of those individuals. Almost all employees mailed the completed survey directly to me using the prestamped return envelope. Two employees scanned their responses and e-mailed me the completed survey form as a .pdf file. These I printed out as hardcopies and immediately deleted the electronic files to prevent possible data theft. All completed surveys were kept in hardcopy form under lock and key.

Participants and Design

Participants in the study were drawn from all professional staff at the civil engineering firm. The final data set includes responses from 221 employees, representing a 55% response rate from those given surveys. Respondents averaged 35 years of age and 73% were male and 83% Anglo American (with the remaining demographic distribution being almost entirely Hispanic).

Respondents did not differ significantly from nonrespondents and firm employees, who averaged 37 years of age and of whom 76% were male and 85% Anglo American. (This was the only demographic information made available regarding nonrespondents.) Matching the structure of the firm, respondents were organized into 40 continuing teams and yielded more than 600 reciprocal dyads for use in the final analysis. Teams had an average of 5.5 respondents each, meaning 3 or 4 members per team failed to respond to the survey. (Members of 45 teams responded, but 5 teams were removed from final analysis because too few respondents completed the round-robin ratings. A team had to yield at least six reciprocal dyadic ratings to be included in the final data set.)

Measures

Where possible, measures used in this study were adapted from established scales reported in respected management research journals (see the appendix). Where measures were significantly adapted, it was done through an iterative process of vetting and feedback involving the members of my dissertation committee, other faculty (from The University of Texas and other institutions where appropriate), the firm's leadership and HR teams at the client site where the study was executed. Means, standard deviations, and correlations for all measures are reported in Tables 1 and 2 in chapter 4.

Independent Variables

Expertise identity. The measure of expertise identity is adapted from the Identity Centrality scale used by Sellers, Rowley, Chavous, Shelton, and Smith

(1997) and the Self-Importance of Moral Identity measure used by Reed and Aquino (2003). Both measures use similar structures to assess the extent to which a given quality (e.g., "being Black," or "being a moral person") is important to someone's sense of self. I modified items to ask how important "being an expert" and "having expertise" is to individual self-concept. Respondents were asked to rate the extent to which they agree with each statement (e.g., "Being an expert in my field is an important part of who I am"). The scale includes three items, each on a 7-point Likert scale (1 = *strongly disagree*, 4 = *neither agree nor disagree,* 7 = *strongly agree*). Cronbach's alpha was .86, suggesting the scale is reliable.

Team identification. To measure team identification, I used six items from a measure used by Kane et al. (2005). Items were chosen to capture the emotional or affective components of identification and not the behavioral dimensions, which emphasize coordination and cooperation. Again, the items used a 7-point Likert scale to capture respondents' agreement or disagreement with a statement (1 = *strongly disagree,* 4 = *neither agree nor disagree,* 7 = *strongly agree*). Respondents were asked to rate the extent to which they agree with each statement (e.g., "I identify with my workgroup" and "I see myself as someone from my workgroup"). Cronbach's alpha for the scale was .86.

General self-efficacy. I used a measure developed by Chen et al. (2001) for generalized self-efficacy, which employs eight items on a 7-point Likert scale to capture an individual's sense of competence and ability to accomplish goals (1 =

strongly disagree, 4 = *neither agree nor disagree,* 7 = *strongly agree*). Respondents were asked to rate the extent to which they agree with each statement (e.g., "In general, I think that I can obtain outcomes that are important to me"). Cronbach's alpha for the scale was .89.

Trust (trustworthiness in another individual). Captured in a round-robin fashion, each respondent rated his or her level of trust in each other individual in the workgroup. I employed a measure developed by Levin and Cross (2004) using two items to assess perceptions of trust in another individual, based on a 5-point[2] Likert scale (1 = *strongly disagree,* 3 = *neither agree nor disagree,* 5 = *strongly agree*). Respondents were asked to rate the extent to which they agree with each statement (e.g., "I assume that this person will always look out for my interests"). Cronbach's alpha for the scale was .85.

Receiver's expertise. The round-robin design was also used to gather information about each respondent's perception of each other team member's degree of expertise. These perceptions were captured using two items adapted from Van der Vegt et al. (2006) and that evaluated a focal individual's assessments of expertise on a 5-point Likert scale (1 = *novice,* 3 = *moderately expert,* 5 = *highly expert*). For instance, respondents were asked, "How would you rate this person's expertise?" Cronbach's alpha for the scale was .79.

[2] A 5-point scale was used for all measures captured via the round-robin design. This was necessary in order to fit the round-robin scales on a single page of the survey. In discussions with the client HR team, it was deemed that keeping this complex and time-consuming aspect of the survey to a single page would go a long way toward preventing participants from becoming discouraged by the requirements of the completing the survey.

Learning orientation. An established measure developed by Bunderson and Sutcliffe (2003) was used to assess individuals' perceptions of their workgroup's learning orientation. This measure was adapted by replacing the workgroup referent with an organizational referent. The measure uses five items to capture respondents' perceptions of the behaviors and priorities evidenced by fellow members of the organization (e.g., "People in this organization look for opportunities to develop new skills and knowledge"). Respondents were asked to rate the extent to which they agree with each statement on a 7-point Likert scale of agreement or disagreement (1 = *strongly disagree,* 4 = *neither agree nor disagree,* 7 = *strongly agree*). Cronbach's alpha for the scale was .88.

Dependent Variables

Willingness to share knowledge. I created a measure of willingness to share knowledge for this dissertation based on the conceptual dimensions of a related measure used by Gray and Meister (2004). Their measure used six items to capture three related aspects of knowledge sharing outcomes. My measure uses six items to capture the extent to which a respondent perceives another individual to be willing to pass on their specialized knowledge and expertise by sharing the full range of personal techniques, reasoning, and experience that form the basis of their mastery. Each item is assessed on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). The dyadic focus of respondents' assessments is based on approaches used by Levin and Cross (2004), which asked other members of a focal individual's workgroup to rate the focal

individual's knowledge sharing contribution. I applied this approach in the round-robin design, asking each individual within a workgroup to rate every other individual. This provided multiple dyadic scores assessing each individual's knowledge sharing behavior. Reliability of the six-item scale was .91, again suggesting a high degree of reliability.

Learning outcomes. A measure of interpersonal learning was modified for this study from a six-item scale of learning outcomes used by Grey and Meister (2004). As with knowledge sharing, evaluations of learning outcomes are based on peer reports of a focal individual. The measure uses six items to capture related aspects of learning outcomes: cognitive replication, adaptation, and innovation (e.g., "Working with this person has helped me develop a better understanding of how to do my own work"). Each item is assessed on a 5-point Likert scale of the respondent's agreement with each statement (1 = *strongly disagree*; 5 = *strongly agree*). Cronbach's alpha was .92.

Control Variables

Several control variables were included to rule out alternative explanations for the knowledge sharing behaviors posited in this study (see the appendix). Three of the controls were selected because they might explain individual motivation to share knowledge with others. The first of these control variables is the conscientiousness component of the Big-Five personality measure, measured with two items from the Ten Item Personality Measure (Gosling, Rentfrow, & Swann, 2003). This is often associated with individual organizational citizenship

behaviors as well as proactive learning behaviors (LePine, Erez, & Johnson, 2002), discretionary behaviors in the workplace that may share motivational bases with willingness to share knowledge. Because several studies have found that job satisfaction motivates extra-role behaviors like knowledge sharing (Bowler & Brass, 2006; Wagner & Rush, 2000), I controlled for job satisfaction using a three-item instrument from the Minnesota Satisfaction Questionnaire. Finally, I controlled for tie strength to rule out the frequency of work-based interactions as a potential explanation of willingness to share knowledge (Levin & Cross, 2004; Reagans & McEvily, 2003) using a two-item measure employed by Levin and Cross. Finally, I controlled for gender, age, and tenure.

CHAPTER 4: ANALYSIS AND RESULTS

Analysis

Before commencing with the multilevel analyses, I generated descriptive statistics for all the variables involved in this study. Means, standard deviations and Pearson correlations are shown in Tables 1 and 2. In order to allow for more meaningful comparison of descriptive statistics, those measures that were assessed on a 5-point scale were rescaled to a 7-point scale using established techniques that have been shown to minimize adverse affects when comparing different scales is unavoidable (Dawes, 2007).

Willingness to share knowledge is positively correlated with the controls for age and tenure, suggesting experience contributes positively to willingness to share knowledge. Willingness to share knowledge is also positively correlated with the independent variables of tie strength, trust, and team identification. However, given that the interactions of these constructs with expertise identity are of interest in this study, any meaning attached to a correlation or lack thereof should be interpreted in the context of the final results regarding the particular interactions.

Table 1

Descriptive Statistics

Reciprocal dyads (n = 603)	Mean	Maximum	*SD*
1. Willingness to share knowledge	4.94	7	1.28
2. Learning outcomes	4.71	7	1.38
3. Expertise identity (S)	5.73	7	1.08
4. Expertise identity (R)	5.73	7	1.08
5. Conscientiousness (S)	5.75	7	0.97
6. Age (S)	35.23	75	11.41
7. Age difference (S-R)	11.23	44	8.61
8. Gender (S)	0.26	—	0.44
9. Gender (S-R)	0.24	—	0.43
10. Tenure (S)	3.69	24	3.85
11. Job satisfaction (S)	5.87	7	0.98
12. Tie strength (S-R)	5.93	7	1.38
13. Self-efficacy (S)	5.87	7	0.68
14. Trust (S-R)	5.42	7	1.56
15. Expertise (S-R)	4.84	7	1.46
16. Team identification (S)	5.89	7	1.07
17. Learning orientation (S)	5.47	7	0.98

Note. Variables rated by the source are denoted by (S). Variables rated by the receiver are denotes by (R). Variables showing a dyadic difference between source and receiver or that rated by the source about the receiver are denoted (S-R).

Table 2

Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Willingness to share knowledge	1.00	0.74**	-.01	.03	.04	.14**	-.01	-.02	-.07	.16**	.04	.16**	.01	.25**	.01	.21**	.00
2. Learning outcomes	.74**	1.00	.01	.09*	.04	.15**	-.05	-.05	-.04	.14**	.00	.19**	.01	.22**	.00	.18**	-.03
3. Expertise identity (S)	-.01	.01	1.00	.01	.17**	.09*	.02	.06	-.01	.04	.31**	.14**	.30**	.10*	.02	.33**	.27**
4. Expertise identity (R)	.03	.09*	.01	1.00	.05	.08	.01	.05	-.00	.04	.06	-.01	.06	-.01	.09*	.01	.03
5. Conscientiousness (S)	.04	.04	.17**	.05	1.00	.08	.03	.16**	.08*	.03	.27**	-.01	.34**	.09*	-.01	.09*	.24**
6. Age (S)	.14**	.15**	.09*	.08	.08	1.00	.27**	-.08	-.09*	.37**	.16**	-.08	.09*	-.02	-.05	.09*	.10*
7. Age difference (S-R)	-.01	-.05	.02	.01	.03	.27**	1.00	.01	-.01	.13**	.08*	-.14**	-.02	.02	.02	-.00	.03
8. Gender (S)	-.02	-.05	.06	.05	.16**	-.08	.01	1.00	.30**	-.05	-.00	.07	.10*	.12**	.08	.11**	.12**
9. Gender (S-R)	-.07	-.04	-.01	-.00	.08*	-.09*	-.01	.30**	1.00	-.08*	-.02	-.05	-.04	.05	-.12**	-.03	.04
10. Tenure (S)	.16**	.14**	.04	.04	.03	.37**	.13**	-.05	-.08*	1.00	.13**	.01	.03	.03	-.03	.17**	.05
11. Job satisfaction (S)	.04	.00	.31**	.06	.27**	.16**	.08*	-.00	-.02	.13**	1.00	.11**	.48**	.20**	.04	.41**	.46**
12. Tie strength (S-R)	.16**	.19**	.14**	-.01	-.01	-.08	-.14**	.07	-.05	.01	.11**	1.00	.10*	.43**	.25**	.19**	.18**
13. Self-efficacy (S)	.01	.01	.30**	.06	.34**	.09*	-.02	.10*	-.04	.03	.48**	.10*	1.00	.13**	-.00	.27**	.42**
14. Trust (S-R)	.25**	.22**	.10*	-.01	.09*	-.02	.02	.12**	.05	.03	.20**	.43**	.13**	1.00	.27**	.26**	.28**
15. Expertise (S-R)	.01	.00	.02	.09*	-.01	-.05	.02	.08	-.12**	-.02	.04	.25**	-.00	.27**	1.00	.00	.10*
16. Team identification (S)	.21**	.18**	.33**	.01	.09*	.09*	-.00	.11**	-.03	.17**	.41**	.19**	.27**	.26**	.00	1.00	.42**
17. Learning orientation (S)	.00	-.03	.27**	.03	.24**	.10*	.03	.12**	.04	.05	.46**	.18**	.42**	.28**	.10*	.42**	1.00

Note. $N = 221$ individuals. Variables rated by the source are denoted by (S). Variables rated by the receiver are denoted by (R). Variables showing a dyadic difference between source and receiver or that rated by the source about the receiver are denoted (S-R).
*$p < .05$ (2-tailed). **$p < .01$ (2-tailed).

I analyzed the specific hypotheses in this dissertation using multilevel modeling techniques. Multilevel modeling is an accepted analytical approach that is particularly well suited to the task of assessing random and fixed effects in hierarchically structured data. In the case of this dissertation, the data were hierarchically structured in that the round-robin technique produced a set of dyadic-level data, with each member of the dyad rating the other and visa versa within a group. This produced two reciprocated dyads, one with person A rating person B, and the other with person B rating person A. Individuals were nested within dyads, and the dyads were nested within the groups. Multilevel analysis software applications are uniquely designed to this task (although it is possible to adapt other analytical approaches to the structure of these data). The specific software application I employed in my analysis was the MLwiN software package (Version 2.10; Raudenbush & Bryk, 2002).

I used a specific hierarchical linear modeling application called a social relations model (Kenny, 1994; Snidjers & Kenny, 1999; Van der Vegt et al., 2006). The social relations model was designed to assess social perceptions between individuals, which was appropriate to this dissertation given the perceptual nature of the dependent variable: the source's willingness to share knowledge. The social relations model manages random and fixed effects by assigning dummy variables to each individual and dyad within a group. In this fashion, the model avoids counting individuals multiple times in terms of the multiple ratings they give other members and that they receive from other

members, producing an appropriate accounting of statistical power. Although this application only represents one aspect of the social relations model's potential, this was the primary benefit for my purposes here in analyzing the round-robin data and the hypotheses presented in this dissertation.

Since multilevel modeling is designed to model effects attributable to group, dyadic, and individual levels, this approach allows for the examination of variance on whatever level or cross-level is appropriate based on the specific effects being hypothesized. Fixed effects and their corresponding coefficients produced by the analytical software are comparable to the unstandardarized coefficients yielded in ordinary least squares regression analysis. Similarly, these coefficients indicate the strength of the statistical relationship between the independent and dependent variables, which also can be tested based on significance levels using similar approaches to ordinary regression analyses. Simple *t* tests are used to evaluate significance levels, where the value for *t* is calculated as the coefficient divided by the standard error (both produced by the MLwiN software) for each term. The incremental explanatory power of each statistical model (i.e., how well each model fits the data compared to an earlier model) can be evaluated using -2 log likelihood statistics. The software also produces -2 log likelihood (-2 log L) statistics for each model generated. The difference between these statistics can be used to determine the incremental explanatory power of each model, which is equivalent to a multivariate test of significance against a standard chi-square distribution. Due to the nature of the

hypotheses in this dissertation, all statistical testing was accomplished using these two methods.

The dependent variable in the analyses of Hypotheses 1–5 is the source's willingness to share knowledge as rated by the receiver. All of the hypothesized relationships in this dissertation (with the exception of Hypothesis 6) take the form of interactions between two variables (one of which is always expertise identity) in their relationship to willingness to share knowledge; therefore, I used accepted procedures for the testing of interactions, identical to those applied in ordinary least squares regression (Aiken & West, 1991). In this approach, the two variables that were tested in the interaction were entered together to determine their independent influence on the dependent variable and the overall model. Finally, the interaction term was added to the model to assess its coefficient and impact on explanatory power. As recommended by Aiken and West, all variables involved in the interaction have been centered.

I ran separate sets of models to test each of the hypotheses in this dissertation. In each set, I generated models in the following sequence with regard to the entry order of included variables.

Model 1 involved entry of the control variables only. (Because this was the baseline model, there was no change in the -2 log L statistic to report.) The selection of the appropriate controls for each model was determined based upon the nature of the interaction variable of interest. For instance, for the self-efficacy

model, controls were included for the individual only, whereas in the dyadic trust model, the controls were included specific to the dyad in question.

Model 2 involved entry of the expertise identity variable and the particular contingency variable that was tested in interaction with expertise identity. (There was no hypothesized main effect for expertise identity, so the entry of these terms could be combined in a single step.)

Model 3 involved entry of the interaction term. The coefficient of the interaction term and the incremental explanatory power of this model were used to test the corresponding hypotheses.

Results

Interaction of Expertise Identity and General Self-Efficacy

Hypothesis 1 stated that the strength of individuals' expertise identity would interact with their general self-efficacy in predicting knowledge sharing, such that people with strong expertise identity would be more likely to share knowledge when general self-efficacy was high but less likely to share when general self-efficacy was low. Table 3 shows the modeled analyses of the interaction between expertise identity and general self-efficacy produced by the social relations model. The controls selected for this model were the age, gender (Van der Vegt et al., 2006), and conscientiousness of the source individual. Conscientiousness was specifically chosen to control for a potential alternative explanation of individual-centered motivation in contrast to individual general self-efficacy. The coefficients of expertise identity and general self-efficacy were

not significant. In Model 3, the interaction term between expertise identity and self-efficacy was entered. The coefficient was not significant, suggesting a lack of support for Hypothesis 1.

Table 3

Modeling Expertise Identity x Self-Efficacy in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Source's age	.01	(.01)	.01	(.01)	.01	(.01)
Source's gender	-.08	(.09)	-.08	(.08)	-.09	(.09)
Source's conscientiousness	.03	(.04)	.03	(.04)	.04	(.04)
Expertise identity			-.02	(.03)	.03	(.03)
Self-efficacy			-.01	(.05)	-.03	(.06)
Expertise identity x self-efficacy					-.07	(.04)
Δ -2 log L			0.01		3.03	

*$p < .05$. **$p < .01$. ***$p < .001$.

Interaction of Expertise Identity and Trust in Receiver

Hypothesis 2 stated that the strength of individuals' expertise identity would interact with their trust in receivers to predict knowledge sharing, such that individuals with strong expertise identity would be more likely to share knowledge when trust in the receiver was high but less likely to share when trust

in the receiver was low. Table 4 shows the modeled effects of expertise identity and the source's trust in the receiver.

Table 4

Expertise Identity x Trust in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Source – receiver age difference	-.01	(.01)	-.01	(.01)	-.01	(.01)
Source – receiver gender difference	-.11	(.08)	-.13	(.07)	-.12	(.07)
Source – receiver tie strength	.18***	(.04)	.12**	(.04)	.13**	(.04)
Source's expertise identity			-.02	(.04)	-.01	(.04)
Trust			.26***	(.03)	.24***	(.03)
Expertise identity x trust					.08**	(.03)
Δ -2 log L			42.54** *		8.91***	

* $p < .05$. ** $p < .01$. *** $p < .001$.

In this series of models, age and gender were again included as controls. Consistent with Van der Vegt et al. (2006), I controlled for the differences in gender and age between the individuals in the particular dyad. Age difference was calculated as the absolute value of the difference between the ages of the two individuals in the dyad, and gender difference was calculated as a 1 for same-

gender dyads and a 0 for different-gender dyads (these approaches are consistent with established analyses of dyads). Tie strength was also entered as a control in this model, given its well-established relationship to trust (Levin & Cross, 2004). The strength of the social tie between the individuals in the dyad was considered in order to rule out that explanations of trust might be due instead to the closeness of the working relationship between individuals.

In Model 2, the trust coefficient turned out to be positive and highly significant (at the $p < .001$ level). This was not a surprising finding, again given the explanatory power that trust has been shown to have in previous models of knowledge sharing (Levin & Cross, 2004). This model also showed a significant increment in explanatory power (at the $p < .001$ level). The final Model 3 in Table 4 shows the effect of the addition of the interaction term of expertise identity and trust. This term was positive and significant ($p < .01$), as was the explanatory power of the interaction model ($p < .001$). These findings supported Hypothesis 2.

To further explore this result, I graphed the interaction between expertise identity and trust using standard Aiken and West (1991) procedures for plotting two-way interactions. The equation used includes both predictor variables and the interaction term and was calculated to plot lines at one standard deviation above and below the mean for both predictor variables—in this case, expertise identity and trust. This yielded a graph showing the source's willingness to share knowledge at various levels of expertise identity and trust. The plot (Figure 1)

shows that the effect of expertise identity on willingness to share knowledge was positive when trust in the receiver was high and negative when trust in the receiver was low. This finding was also consistent with the prediction in Hypothesis 2.

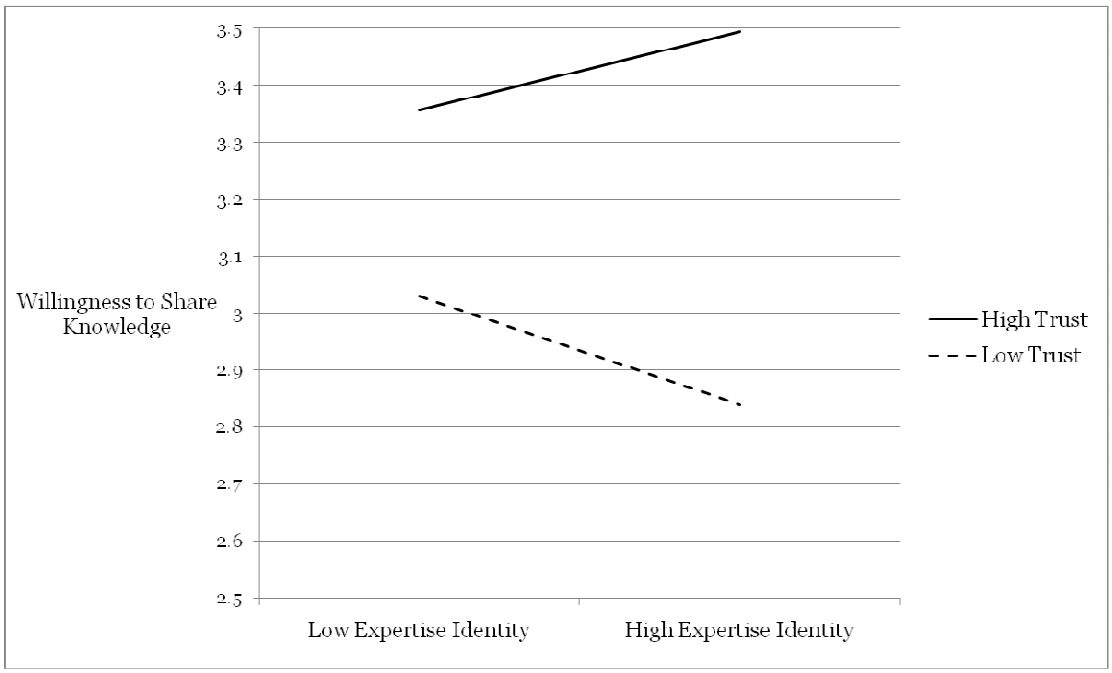

Figure 1. Expertise identity x trust.

Interaction of Expertise Identity and Receiver's Expertise

Hypothesis 3 stated that the strength of a knowledge source's expertise identity would interact with the receiver's level of expertise in predicting knowledge sharing, such that knowledge sources with strong expertise identity would be more willing to share knowledge with high-expertise receivers while also being less likely to share knowledge with low-expertise receivers. Table 5 shows the modeled relationship between the source's expertise identity and the

source's perception of the receiver's expertise in predicting willingness to share knowledge.

Table 5

Modeling Expertise Identity x Receiver's Expertise in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Sharer – receiver age difference	-.01	(.01)	-.01	(.01)	.01	(.01)
Sharer – receiver gender difference	-.11	(.08)	-.11	(.08)	-.10	(.08)
Sharer – receiver tie strength	.18***	(.04)	.19***	(.04)	.18***	(.04)
Sharer's expertise identity			-.02	(.04)	-.02	(.04)
Receiver's expertise			.03	(.03)	.03	(.03)
Expertise identity x receiver's expertise					.07**	(.03)
Δ -2 log L			0.55		8.20***	

*$p < .05$. **$p < .01$. ***$p < .001$.

Since this hypothesis also had to do with the relationship between individuals in a dyad, the same controls that were used in modeling the trust hypothesis were employed here—age and gender differences and tie strength. Model 2 in Table 5 shows the addition of expertise identity and the receiver's expertise variables. These coefficients were not significant, and the model did not

add significantly to explanatory power. In Model 3, the interaction between expertise identity and the receiver's expertise was entered. The coefficient for this term was significant ($p < .01$), as was the increment in model explanatory power ($p < .001$). These results supported Hypothesis 3.

A plot of the relationship (Figure 2) shows the source's willingness to share knowledge at various levels of expertise identity and receiver's expertise. Figure 2 shows that the effect of expertise identity on willingness to share knowledge was positive when the receiver was perceived as highly expert and negative when the receiver was perceived as having weak expertise. Therefore, when people have high expertise identity, they are more inclined to share knowledge with others they perceive as highly expert.

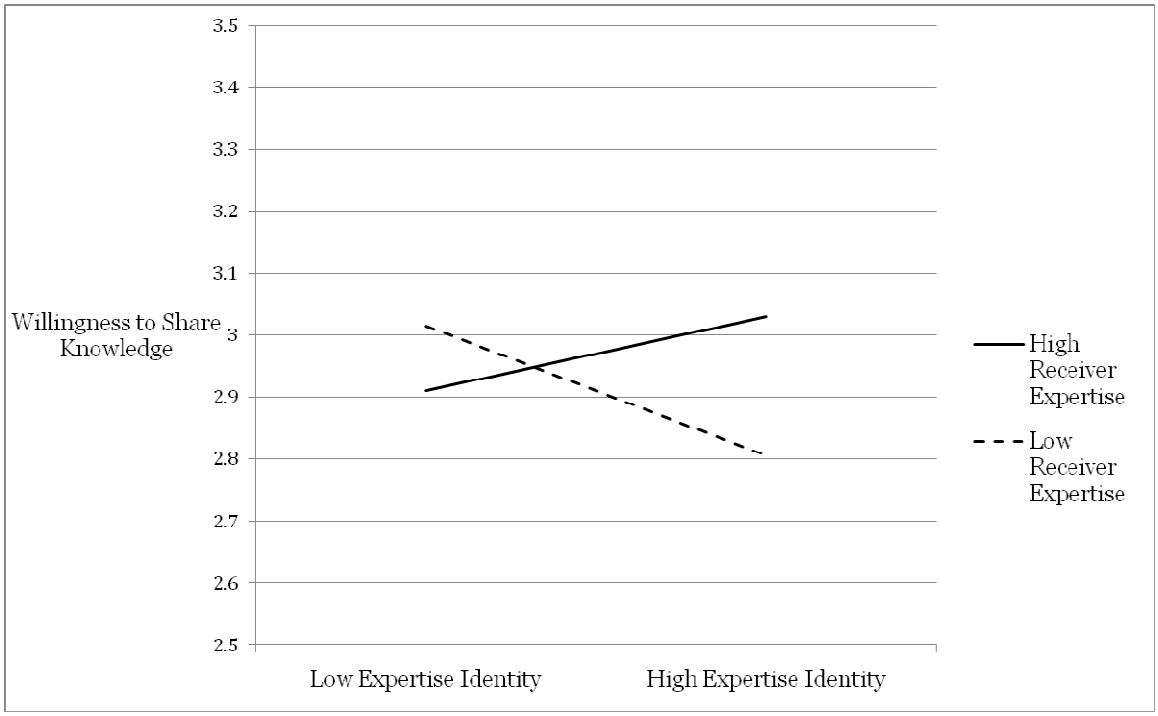

Figure 2. Expertise identity x receiver's expertise.

The results also indicated that when people have low expertise identity, they are less inclined to share knowledge with others they see as having strong expertise. This plot is also consistent with the hypothesized interaction effect.

Interaction of Expertise Identity and Team Identification

Hypothesis 4 stated that the strength of individuals' expertise identity would interact with their degree of team identification in predicting knowledge sharing, such that people with high expertise identity would be more likely to share knowledge when team identification was high but less likely to share when team identification was low. This hypothesis had to do with the individual and his or her connection to the team, so the same set of controls used in modeling self-efficacy (Table 3) was used for this set of models (Table 6).

Model 2 in Table 6 shows the impact of the entry of expertise identity and team identification into the model. The coefficient for team identification was positive and significant ($p < .001$), which was expected, given the demonstrated power of team identification independently to predict both knowledge sharing (Kane et al., 2005) and prosocial team behaviors (Tyler & Blader, 2000). Model 3 included the interaction term between individual expertise identity and team identification. This term was positive and significant ($p < .01$). The model was also significant ($p < .05$), and the coefficient for team identification remained significant. These results supported Hypothesis 4.

Table 6

Modeling Expertise Identity x Team Identification in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Source's age	.01	(.01)	.01	(.01)	.01	(.04)
Source's gender	-.08	(.10)	-.07	(.10)	-.05	(.10)
Source's conscientiousness	.03	(.04)	.03	(.04)	.03	(.04)
Expertise identity			-.09*	(.04)	-.04	(.04)
Team identification			.20***		.20***	(.04)
Expertise identity x team identification					.07**	(.02)
Δ -2 log L			27.99***		5.44*	

*$p < .05$. **$p < .01$. ***$p < .001$.

A plot of the relationship (Figure 3) shows the source's willingness to share knowledge at various levels of expertise identity and team identification. Figure 3 shows that the effect of expertise identity on willingness to share knowledge was positive when identification with the team was high and negative when identification with the team was low. Therefore, when people have high expertise identity, they are more inclined to share knowledge when they identify closely with the team and less inclined when they do not. This plot is also consistent with the hypothesized interaction effect.

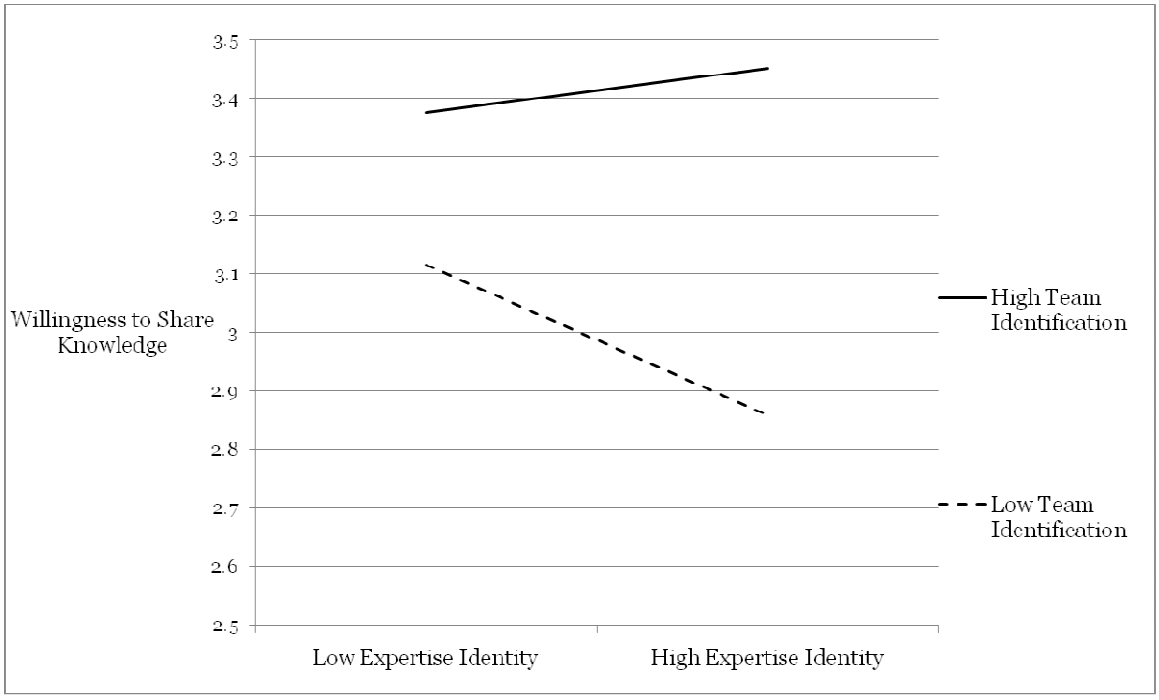

Figure 3. Expertise identity x team identification.

Based on visual analysis of Figure 3, the shallow slope of the linear relationship between expertise identity and knowledge sharing at high levels of team identification warranted further post hoc analysis. I used established methods for testing simple slopes (Aiken & West, 1991) to determine if the slope of the relationship between expertise identity and knowledge sharing at high levels of team identification was significantly different from zero. Analysis indicated that the slope was significantly different from zero at $p < .001$.

Interaction of Expertise Identity and Learning Orientation

Hypothesis 5 stated that the strength of individuals' expertise identity would interact with their perception of the organization's learning orientation in predicting knowledge sharing, such that individuals with strong expertise identity

would be more likely to share when learning orientation was strong but less likely to share when learning orientation was weak. Table 7 shows the model of expertise identity and general learning orientation.

Table 7

Modeling Expertise Identity x Learning Orientation in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Age	.01	(.01)	.01	(.01)	.01	(.01)
Gender	-.06	(.08)	-.05	(.08)	-.05	(.08)
Tenure	.03***	(.01)	.03***	(.01)	.03***	(.01)
Job satisfaction	.01	(.04)	.02	(.04)	.01	(.04)
Expertise identity			-.01	(.03)	-.02	(.03)
Learning orientation			-.03	(.04)	-.02	(.04)
Expertise identity x learning orientation					-.01	(.03)
Δ -2 log L			.41		.16	

*$p < .05$. **$p < .01$. ***$p < .001$.

In this model, given the motivational nature of learning orientation in terms of how much value is placed on knowledge sharing in the environment, the source's tenure and job satisfaction were included as controls in addition to age and gender, which was consistent with similar studies on orientation (Bunderson

& Sutcliffe, 2003). Neither the entry of learning orientation nor the addition of the interaction term with expertise identity yielded significant coefficients. These results did not provide support for Hypothesis 5.

Willingness to Share Knowledge and Learning Outcomes

Hypothesis 6 stated that there would be a positive relationship between the willingness of a source to share knowledge with a receiver and the learning outcomes realized by the receiver. Table 8 shows the relationship between willingness to share knowledge perceived in the source and the learning outcomes reported by the receiver (the dependent variable in this model). Model 1 shows the control-only model. It should be noted that there was a significant and positive coefficient for the receiver's expertise identity, indicating a positive relationship with evaluations of the learning outcomes realized in interactions with other individuals. The implications of this relationship are discussed in chapter 5.

Finally, Model 2 in Table 8 shows a strong positive coefficient for the relationship between a source's willingness to share knowledge and learning outcomes realized in interactions with the source ($p < .001$). This result supported Hypothesis 6. It should be noted, however, that the order of magnitude of the coefficient was extremely high, a result that was most likely a function of the two variables' measuring similar underlying constructs. This was not an unsurprising finding, given the theorized relationship between the two constructs, and is discussed in greater length in chapter 5.

Table 8

Relationship Between Willingness to Share Knowledge and Receiver Learning Outcomes

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Source – receiver age difference	-.01	(.01)	-.01	(.01)	-.01	(.01)
Source – receiver gender difference	-.11	(.08)	-.00	(.07)	-.10	(.08)
Source – receiver trust	.24***	(.03)	.03	(.03)	.22***	(.04)
Source tenure	.04***	(.01)	.01	(.01)	.04***	(.01)
Source expertise identity	-.01	(.04)	.01	(.02)	-.02	(.04)
Receiver expertise identity	.09**	(.04)	.05*	(.03)	.09**	(.04)
Source willingness to share knowledge			.74***	(.03)	.15***	(.05)
Δ -2 log L	1.2		432.24***		8.05***	

*$p < .05$. **$p < .01$. ***$p < .001$.

Post hoc Analysis of Expertise Identity, Team Identification, and Dyadic Trust

Given the strong support found for Hypotheses 2 and 4, I explored the possibility that these two results might be evaluating the same underlying construct and relationships. This concern was based on the well-established relationship between team identification and trust between team members (Tyler

& Blader, 2000) and the potential for these two constructs to become confounded in terms of both reflecting an underlying connectedness to team members. Therefore, in post hoc analyses, I explored this contingency by evaluating a model that included both constructs and their interactions with expertise identity in the same analyses (Table 9). In Models 1 and 2, I included both dyadic trust and team identification with one of each of their interaction terms with expertise identity. These models showed no weakening of significance of either interaction coefficient when both trust and team identification were included in the model, suggesting little potential confounding between the measures. These findings supported the original interpretation of Hypotheses 2 and 4.

Table 9

Modeling Expertise Identity x Trust and Expertise Identity x Team Identification in Predicting Willingness to Share Knowledge

	Model 1		Model 2		Model 3	
Variables	Est.	*SE*	Est.	*SE*	Est.	*SE*
Age	.01	(.01)	.01	(.01)	.01	(.01)
Gender	-.10	(.09)	-.10	(.09)	-.10	(.09)
Expertise identity	-.06	(.04)	-.04	(.04)	-.05	(.04)
Trust	.24***	(.03)	.25***	(.03)	.24***	(.03)
Team identification	.16***	(.04)	.16***	(.04)	.16***	(.04)
Expertise identity x trust	.06**	(.02)			.05*	(.03)
Expertise identity x team identification			.05**	(.02)	.03^{t}	(.02)

$^{t}p < .1$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

In Model 3, I included trust, team identification, and both interaction terms. This model did show a weakening of the interaction coefficients. This was most likely due to the power implications of including additional terms in the model, particularly when the two terms reflect interactions between a common variable (expertise identity) and two variables that are also correlated (trust and team identification; $\sigma = .26$, $p < .01$). Therefore, the interpretation of Model 3 should not be taken as implying a lack of support for Hypotheses 2 and 4.

CHAPTER 5: DISCUSSION

Summary of Findings

The goal of this study was to examine the relationship between team members' expertise identity (the importance they place on that aspect of personal identity) and their willingness to share knowledge with others. I presented an explanation of how expertise identity can become an important component of personal identity, particularly among individuals working in contexts that are knowledge intensive. Consistent with recent research linking components of personal identity to discretionary behaviors, I argued that expertise identity would meaningfully affect individual willingness to share knowledge. Willingness to share knowledge is defined as individuals' willingness to pass on their specialized knowledge and expertise to others, as evidenced by the extent to which they are willing to share the full range of personal techniques, reasoning, and experience that form the basis of their own mastery. I further argued that multiple identity theories—namely self-verification, self-enhancement, optimal distinctiveness and social comparison theories—do not lead to a single, dominant prediction regarding the effects of expertise identity on willingness to share knowledge. Rather, these theories suggest that expertise identity will have either a promotive or an inhibitive effect on willingness to share knowledge, contingent upon the influence of other factors, including an individual's self-concept, dyadic social relationships, identification with relevant social groups, and the environmental context. Specifically, I hypothesized that the effects of expertise

identity on willingness to share knowledge would depend on the source's general self-efficacy, trust in the receiver, perception of the receiver's expertise, team identification, and perception of general learning orientation in the organization. In each case, I predicted that expertise identity would lead to greater willingness to share knowledge at higher levels of these contingency factors and less willingness to share knowledge at lower levels of these factors.

Supported Hypotheses

I tested these predictions in a field study of knowledge workers. Findings supported four out of six hypotheses. Specifically, I found that high expertise identity is associated with greater willingness to share knowledge when the source's trust in the receiver is high (Hypothesis 2), when the source sees the receiver as being high in expertise (Hypothesis 3), and when the source identifies strongly with the team (Hypothesis 4). Conversely, high expertise identity is associated with less willingness to share knowledge when each of these factors is low.

Findings also supported Hypothesis 6, which predicted a positive relationship between a source's willingness to share knowledge and the learning outcomes realized by the receiver. It should be noted that the unusual strength of the relationship between willingness to share knowledge and learning outcomes might be explained by same source bias, since both were evaluated by the knowledge receiver. Given this potential bias, I conducted supplementary tests that showed a significant, positive relationship between a source's self-reported

willingness to share knowledge (a measure not included in the original analysis) and the receiver's reported learning outcomes. Thus, people who were the beneficiaries of a greater willingness to share knowledge on the part of the source also reported greater learning outcomes from their interactions with that source. This evidence reduces concern stemming from same-source bias.

Unsupported Hypotheses

Findings did not support two of the six hypotheses, specifically those that argued that high expertise identity would be associated with greater willingness to share knowledge when the source's self-efficacy is high (Hypothesis 1) or when the source perceives a strong organizational learning orientation (Hypothesis 5). There are several possible explanations for the lack of support for these hypotheses. With regard to Hypothesis 1 in particular, the lack of support may be because of a ceiling effect in respondents' answers to the self-efficacy items. The self-efficacy mean was 5.87 (on a scale of 1.00–7.00) with a very low standard deviation (0.68, the lowest of all the measures in the study), indicating that responses are indeed tightly clustered at the high end of the scale. This ceiling effect might have limited the useful variance to such a degree as to have muted any potential results supporting this hypothesis.

The lack of support for these two hypotheses also may be explained by the more global focus of the two constructs and their measures compared to the other independent variables in the study. The three hypotheses that were supported involve constructs and measures that capture an individual's focused assessment

of specific referent individuals. General self-efficacy and learning orientation, on the other hand, capture more global assessments of one's own capacities or the proclivities of organizational members. The nature of these constructs and scale items simply may be too global in focus to have meaningful implications for individual expertise identity. Researchers in fact have speculated that global self-esteem measures do not predict specific behaviors very well (Chen et al., 2001). In the current study, self-efficacy is defined in terms of the extent to which individuals feel they can achieve goals or objectives they set out to accomplish. For respondents, questions of such general composure may have had little bearing on the specific nature of their expertise identities or their assessments of specific dyadic relationships.

Similarly, this study might have failed to find support for the learning orientation hypothesis because a respondent's assessment of collective learning orientation requires a more global assessment of norms and behaviors, whereas the other measures in this study are more specific in their focus, referring to specific individuals. Respondents might have perceived little connection between the behaviors and norms described in the collective learning orientation measure and the specific individuals or dyadic relationships within the group or organization that make up a large part of the study. For instance, assessing the statement "people in this organization like to work on things that require a lot of skill and ability" simply may be too removed from respondents' own expertise identities or their perceptions of specific team members' willingness to share

knowledge for meaningful results to have emerged. The global nature of the learning orientation construct is further evidenced by its very design, in that it was meant to be aggregated to the group level to explain collective outcomes, not to be analyzed at the individual or dyadic level. A more effective approach might have been to capture dyadic assessments of learning orientation.

Limitations

Measuring Actual Expertise

This dissertation has several limitations. First, the study does not include an objective measure of actual expertise or of the learning or performance outcomes from knowledge sharing. This makes it difficult to confirm that the sharing taking place and that the outcomes realized from sharing are a function of actual expertise, rather than perceptions of expertise. It is possible, for example, for members to have strong expertise identities and share a great deal of knowledge with each other but not possess the actual expertise to back it up. In this case, the knowledge shared may not be useful or may be inaccurate. Members may believe they are learning from each other despite the poor quality of the knowledge being shared. Without a measure of actual expertise, I was unable to confirm that willingness to share knowledge was supported by actual expertise. Such measures are extremely difficult to employ in field studies, however. Measuring actual expertise likely would require some sort of aptitude or applied knowledge testing, which is extremely difficult to develop accurately. Further, in many field contexts, such testing is prohibitively difficult to employ,

because it requires administering to each person an individually customized test or administering a single comprehensive test to everyone, in which case the test would be quite extensive, with only a part of it relevant to any given individual.

In the absence of a measure of actual expertise, we may at least look to agreement among team members' evaluations of a focal member's expertise as an indicator of consensus regarding perceptions of individual expertise. This approach has been used effectively in previous studies of expertise (Van der Vegt et al., 2006). Furthermore, studies have shown that agreement among group members' perceptions of individual expertise is highly correlated with actual expertise and performance (Littlepage & Silbiger, 1992). In post hoc analyses, I used multilevel modeling procedures developed by Snidjers and Kenny (1999) to evaluate the apportionment of variance in team members' ratings of each others' expertise. Results of this analysis showed 77% agreement in team members' perceptions of a focal individual's expertise, referred to in social relations modeling as *target effects* (i.e., the tendency for a given individual to elicit similar ratings from team members). This high degree of agreement among team members in their evaluations of a focal individual's expertise lends some support to the premise that perceptions of expertise in this study are indeed reflective of actual expertise.

Study Context

A second limitation stems from the context in which this study was conducted. The fact that this organization maintains the continuity of teams to

such a degree is somewhat unique, creating at once a limiting and a distinguishing characteristic of the findings. As a limiting factor, the continuing structure of the teams studied could make it difficult to generalize these findings to organizations that do not employ such structures or in which consistent if not frequent turnover in team membership is more often the norm. The fact that turnover was limited in the context of this study is also a distinguishing factor, however, because it might have resulted in higher levels of relational trust and team identification than might be found among team members in other organizations, allowing this study to find significance results. Research has shown that turnover creates social and relational challenges for team member interactions (Levine & Choi, 2004). In organizations where turnover is more prevalent, it may be more difficult to find significant results, as high turnover could create a floor effect on the variance in relational trust and team identification. In summary, despite difficulties in replicating the results from this study in organizations where teams experience more frequent turnover in membership, one of the strengths of this study is that it allows for the analysis of interactions between trust, identification, and expertise identity that might not have otherwise emerged.

Potential Generalizability

The findings from this study might not be generalizable to organizations that do not rely on knowledge-based collaboration in the performance of work. While the knowledge-intensive work conducted in the organization studied here

may be increasingly common in knowledge-based economies, many organizations continue to rely on independent work and production. While workers in such contexts still may be expected to place greater importance on their expertise identity for the same reasons outlined in this study, it also could be argued that expertise identity may not manifest in knowledge-sharing behaviors to the same degree in contexts where knowledge-based exchanges are less normative. However, even in organizations that do not rely on the regular exchange of knowledge for the completion of work, knowledge exchange is still required in some instances and equally critical to organizational outcomes. Consider the example of a job-shop organization in which management has asked a senior worker (who may be likely to retire soon) to mentor another individual before he leaves in order to pass on his unique knowledge. The findings from this study suggest that—if the senior worker places greater importance on his expertise identity—management's choice of the mentee could have a meaningful impact on the extent to which the senior worker shares what he knows. If management fails to consider the importance of relational dynamics such as trust and relative expertise, the senior worker may withhold his unique knowledge from his associates, and when he does leave the organization he will take that knowledge with him. Thus, it is possible that expertise identity is relevant to knowledge transfer in organizations that nevertheless do not rely specifically on knowledge collaboration.

Other Limitations

An additional limitation of this study design is the inability to disentangle exactly which identity motives were operating to yield the results. In developing arguments for the hypothesized relationship between expertise identity and willingness to share knowledge, multiple theories were evoked to make the case for both the promotive and inhibitive effects of expertise identity. This is understandable given the complex nature of the hypotheses and the importance of making a compelling case for the study, but it becomes difficult to determine if all of the identity theories invoked contributed to the observed effects or if only a subset of the theories did. This limitation is addressed further in the section on future research.

Implications for Theory

The findings from this study have several important theoretical implications. This study provides support for perspectives that consider the link between theories of personal identity and discretionary behavior (Aquino & Reed, 2002). By marrying expertise identity to willingness to share knowledge in a knowledge-intensive context, this study shows how component personal identity (in this case expertise identity) can help explain willingness to engage in workplace behaviors (in this case willingness to share knowledge). This promises to pave the way for developing theoretical connections between component identity and individual motivation.

Advancing Relational Perspectives on Knowledge Sharing

This study underscores the importance of relational dynamics in knowledge sharing research. The results discussed here show that when people with strong expertise identities also have a high degree of relational trust in their teammates and a strong sense of team identity, they are more willing to share their knowledge with others on the team. Trust has important implications for the extent to which knowledge sharing is expected to be self-verifying as well as for the risks people perceive with regard to others' intentions in using the knowledge shared. Team identification represents a sense of belonging to the team and a connectedness to other team members that makes these relationships more meaningful and central to the individual's self-concept. In this regard, the extent to which a person identifies with the team is a deeply relational evaluation of the other members of the team and the extent to which a person sees himself or herself as sharing qualities in common with them, making that person more willing to share knowledge in these relationships. Similarly, results of this study suggest that people who have strong expertise identities will be more willing to share their knowledge in interactions with others they perceive as also high in expertise, perhaps because such relationships offer greater benefits than risks to self-concept. For people with strong expertise identities, perceptions of receivers' levels of expertise reflect an assessment of others based on the characteristic that is the most relevant basis for social comparison, which is expertise (Van der Vegt et al., 2006). That this study yielded significant results for these three factors—

relational trust, team identification, and receiver expertise—suggests that relational connectedness , whether based on trust, social identity, or important shared qualities, can have an important influence on the relationship between individual expertise identity and willingness to share knowledge with others.

Implications for Self-Verification Theory

Results of this study support the premise that people choose whether or not to engage in self-verifying behaviors based on characteristics of particular relationships. While this premise is not new to self-verification research, it has received little theoretical or empirical attention compared to the large body of research emphasizing the critical role that self-verification plays in people's choices of interaction partners (for a review and an exception, see Swann, 2000). Yet, in organizational contexts people are often not in a position to choose their interaction partners but are assigned to work with particular individuals or on a particular team. People are, however, able to exercise discretion in the behaviors they choose to engage in or avoid within the context of these relationships. This study suggests people will determine whether to engage in more or less self-verifying behavior based on qualities of the relationship, arguing that people may be more likely to engage in self-verifying behaviors in relationships that are characterized by a high degree of trust or when there is a strong sense of relational connectedness as a result of team identification. The hypothesis that resulted from these arguments was supported. Furthermore, whereas previous research has demonstrated that self-verifying behaviors can lead to greater

connectedness to others (Swann et al., 2000), the theoretical relationships presented in this study suggest that the reverse may be true as well. Unfortunately, the direction of the effect cannot be confirmed in this study. A follow-up study could be designed specifically to test the directionality of these effects.

Finally, the results of this study suggest a slightly different interpretation of the criteria people use in selecting relationships that are most likely to self-verify. The results of this study show that people are more likely to self-verify with others who are perceived as being strong in a relevant component of personal identity—in this case, expertise—and therefore more capable of verifying their own expertise identities. The impact of this type of relational criteria on people's choices of self-verification partners has not been considered in self-verification theory and should be examined in greater detail in subsequent research, with particular attention to the direction of effects (discussed above). The suggestion that people with high expertise identity may be more likely to self-verify with others who are high in expertise also lends support to the perspective suggested above—people choose connected relationships that are more likely to self-verify, rather than the other way around (i.e., becoming more connected to people through the process of self-verification).

Implications for Social Comparison Theory

This study also has interesting implications for social comparison theory. As discussed earlier, making positive social comparisons with other individuals

underlies several established theories of individual identity motivation, including the drives to maintain optimal distinctiveness and to self-enhance. According to social comparison theory, people choose comparison-others who are most likely to produce favorable comparisons, usually based on some evaluation of their competencies that are relevant to the specific comparison being made, such as ability or performance (for a review, see Buunk & Mussweiler, 2001). The results of this study, however, suggest a slightly different perspective on the choice of social comparison-other. That the relational hypotheses were supported suggests that people may choose to make social comparisons with people to whom they feel relationally connected, in this case by trust and social identity. This emphasis on choosing social comparison-others based on relational connectedness is a slight departure from established social comparison research in that these qualities have nothing to do with relative performances or competencies that usually form the basis of the comparison. The considerations people take into account when determining with whom to make social comparisons should be more deeply explored.

Implications for Optimal Distinctiveness Theory

The study has interesting implications for optimal distinctiveness theory. Optimal distinctiveness theory says that people will be motivated to balance the unique aspects of their personal identities with those aspects of identity that connect them to other people based on shared qualities (Brewer, 1991). What is not specified by the theory is how people will seek to balance the unique aspects

of their personal identities when relationships or team identification are weak. Support for the team identification hypothesis in this study suggests that people are more inclined to emphasize those unique aspects of personal identity when social identification is strong and less inclined when it is weak, indicating that people seek to keep these identities in balance regardless of the degree of social identification. Furthermore, the results from this study are consistent with the explanation that people may be more inclined to assert the distinctive aspects of their identities in relationships that are safe (i.e., high in relational trust) and in which the other person is expected to appreciate those distinctive qualities (as reflected in the results regarding receiver expertise). This means that people may be more inclined to assert their distinctiveness not only as a means to balance against social identities, but also when relational characteristics are present that increase the likelihood that their efforts to assert their distinctiveness will be effective. This expanded way of thinking about optimal distinctiveness theory and the reasons people assert their unique personal identities suggests people are motivated not just by maintaining balance between personal and social identities, but also by the potential benefits and reduced risks associated with asserting their unique identity in the presence of others they trust or to whom they are connected by shared qualities.

Other Contributions to Theory

A closely related theoretical contribution has to do with the contextualized nature of my approach. This dissertation reinforces the value of exploring social

and relational perspectives in context by showing how expertise identity actually interacts with relational dynamics to enhance their explanatory power. Whereas previous approaches have considered multiple aspects of identity and context in the same study (Farmer et al., 2003), a rare few have the considered the types of contextualized interactions explored in this study. This current study lays the groundwork for future studies integrating individual identity with social context explanations.

Finally, this study provides an important example of the untapped potential of individual-centered explanations of knowledge sharing. Whereas most previous explanations have focused almost exclusively on qualities of the knowledge environment, social structures, and relational dynamics (Levin & Cross, 2004), this study introduces an explanation based on individual differences. Whereas previous studies have tried and failed to deliver compelling support for individual-centered explanations of knowledge sharing, this particular study succeeds in a way that may lend encouragement and credibility to such approaches (Kankanhalli et al., 2005).

Implications for Practice

This study has important implications for management practice. First, the findings from this study suggest that managers could benefit from paying closer attention to how the personal identities of individual employees affect specific work-relevant behaviors. Particularly in contexts like those of knowledge worker organizations, where some aspects of personal identity—like expertise—may be

more germane than others, managers may manage team membership and relational dynamics more effectively if they have a greater understanding of how individuals vary in the importance they place on expertise identity. For instance, an emphasis on trust and team identification may be important in any teamwork context, but these relational dynamics become critical to knowledge sharing when considered among individuals with higher levels of expertise identity. A related practical implication is the need for managers to consider how individual qualities interact with aspects of social context. This may be particularly important for managers deciding where to expend effort in developing positive team social identity. For instance, where previous research has shown that developing a strong team social identity should encourage knowledge sharing among all members, the findings of this study suggest that developing a strong team social identification will have an even stronger effect on sharing for those who are high in expertise identity.

A second practical implication is that managers in knowledge worker organizations need to recognize that experts may vary in the importance they place on their expertise. Findings suggest that bringing together people with varying levels of expertise and who place varying importance on the expertise they possess may not result in the open exchange of knowledge that managers seek. For instance, findings from this study show that people with a high expertise identity are less likely to share knowledge with people they view as lower in expertise. Therefore, those people who need knowledge the most may

not receive it, and those who possess the most valuable knowledge may be guarded in sharing it. Meaningful knowledge sharing may be taking place only between those individuals who are perceived as highly expert and those other individuals who place strong personal importance on expertise, creating a potential barrier to effective knowledge sharing between experts and nonexperts. Research has characterized a similar effect, recognizing that those who could benefit most from the knowledge sharing efforts of experts may be the least likely to receive them (Van der Vegt et al., 2006).

Future Research

Several promising areas of future research are suggested by this study and its findings. First, having established the relevance of the expertise identity construct developed in this dissertation, a follow-up study could be conducted to examine more specifically which identity mechanisms account for these effects and in what contexts. For instance, a laboratory study could be designed to prime expertise identity and then introduce subjects to different conditions specifically designed to test the functioning of the various identity theory motives. Effective manipulations for such a study easily could be drawn from existing research in the area of each of the identity theories discussed here. A laboratory approach to the study of expertise identity also could yield a more precise understanding of how this component identity influences other aspects of individual expertise and knowledge use, such as willingness to learn from others and to participate in group information processing. As noted in chapter 4, the finding that expertise

identity also influences an individual's perceptions of the value of others' knowledge suggests the effects of expertise identity may be more expansive than hypothesized here and worthy of further exploration.

Second, this study suggests a possible, interesting link between expertise identity in contexts that are knowledge intensive and the extent to which people are open and able to learn from one another. Whereas this study focused on the expertise identities of individuals in dyadic relationships, a future study could be designed to evaluate the impact of diversity among team members' expertise identities and the resultant effects on team learning and performance. For instance, a study could explore whether greater heterogeneity or homogeneity in the strength of members' expertise identities is more likely to contribute to information processing, learning, and performance in the team. Such a study also could be designed in concert with the study discussed above to explore how components of personal identity interact with other levels of identity (i.e., personal, relational, and social identities) to influence social cognition and team learning outcomes.

A third line of future inquiry could contrast the identity motives explored in this dissertation with more commonly recognized exchange-based dynamics. This research could explore the effects of social reciprocity on identity motives and knowledge sharing as well the impact of organizational rewards and task structures. These explanatory mechanisms were not considered in this original study for the simple reason that previous research on knowledge workers has

failed to find consistent results supporting the influence of social exchange mechanisms and further has suggested that exchange mechanisms will have unanticipated effects in such contexts (this reasoning is described in greater detail in the Theory section in chapter 2). Research contrasting identity and exchange dynamics in relational contexts promises to yield even greater insight into how the contexts that implicate personal identity simultaneously may be influenced, or not, by social exchange.

Summary

Taken together, the findings of this study suggest three principal contributions. First, this study introduces expertise identity, an important construct relevant to the study of knowledge sharing. Where prior research has failed to produce results for individual-centered explanations of knowledge sharing, this study has shown that expertise identity can explain how individuals differ in their willingness to share knowledge.

Second, this study lends further support to relational perspectives on knowledge sharing. Where prior research has established the importance of relational characteristics in knowledge sharing relationships, this study advances our understanding of relational dynamics by showing how they promote or inhibit the relationship between expertise identity and willingness to share knowledge. In this way, relational dynamics are seen to have an even more meaningful combinative influence on knowledge sharing behavior than has been demonstrated in prior research of these dynamics alone.

Third and finally, this study supports an expanded perspective on the criteria people use in selecting with whom to share their central personal identities. Relational qualities like trust and connectedness to others influence our willingness to share knowledge as means of self-verifying our identities, asserting our distinctiveness and enhancing our self-concept. Furthermore, our selections of whom to share knowledge with may be more important than ability or opportunity to share.

APPENDIX: MEASURES

Willingness to Share Knowledge

[*Note:* Measured on a 5-point Likert scale: 1 = *strongly disagree* to 5 = *strongly agree*. Elaborated explanations = Items 1, 2. Describing reasoning = Items 3, 4. Relaying personal experience = Items 5, 6.]

Please write the name of each team member in the space provided:

_____

Please respond to the following in terms of the extent to which you agree or disagree with each statement:

Think of an individual's knowledge as the expertise, methods and approaches he/she uses to accomplish tasks and solve problems at work.

Now think about this individual's knowledge in the context of your work-related interactions. In your interactions with this person, to what extent does he/she demonstrate a willingness to do the following?

1. provide detailed descriptions of how he/she puts knowledge to use.
2. explain what work works and what doesn't in accomplishing tasks or solving problems.
3. share insights into the best way to approach a task or problem.
4. explain his/her reasoning about the knowledge required for a particular situation.
5. describe the behaviors, choices, and trial-and-error processes that were a part of his/her personal learning experience.
6. share the details of how his/her knowledge and expertise was acquired

Learning Outcomes

[*Note:* Adapted from a six-item scale of Learning Outcomes used by Gray and Meister, 2004. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*.– cognitive replication = Items 1, 2. Cognitive adaptation = Items 3, 4. Cognitive innovation = Items 5, 6.]

Please write the name of each team member in the space provided:

_____

Working and interacting with this person has:

1. helped me develop a better understanding of how to do my own work.
2. increased my knowledge of proven methods and procedures.
3. stimulated me to continuously revise and adapt my own thinking.
4. helped me to keep my work-related knowledge up to date.
5. stimulated some of my own innovative thinking.
6. helped me to think of some revolutionary ways to approach my work.

Expertise Identity

[*Note:* Adapted from the Identity Centrality Scale used by Sellers et al., 1997, and the Self-Importance of Moral Identity measure used by Reed and Aquino, 2003. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*.]

Expertise is often defined as "the knowledge, skills and capabilities people possess as a result of education, experience and ability."

With that in mind, please respond to each of the following in terms of the extent to which you agree or disagree with each statement:

1. Overall, being an expert has a great deal to do with how I feel about myself.
2. Being an expert in my field is an important part of who I am.
3. Having expertise in my field is important to my sense of self-image.

General Self-Efficacy

[*Note:* developed by Chen et al., 2001. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*.]

1. I will be able to achieve most of the goals that I have set for myself.
2. When facing difficult tasks, I am certain that I will accomplish them.
3. In general, I think that I can obtain outcomes that are important to me.
4. I believe I can succeed at most any endeavor to which I set my mind.
5. I will be able to successfully overcome many challenges.
6. I am confident that I can perform effectively on many different tasks.
7. Compared to other people, I can do most tasks very well.
8. Even when things are tough, I can perform quite well.

Trust

[*Note:* Taken from Levin and Cross, 2004. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7= *strongly agree*.]

1. I assume that this person will always look out for my interests.
2. I assume that this person will go out of his or her way to make sure I am not damaged or harmed.
3. I feel like this person cares what happens to me.

Learning Orientation

[*Note:* Developed by Bunderson and Sutcliffe, 2003. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*.]

People in this organization…

1. look for opportunities to develop new skills and knowledge.
2. like challenging and difficult assignments that teach new things.
3. are willing to take risks on new ideas in order to find out what works.
4. like to work on things that require a lot of skill and ability.
5. see learning and developing skills as very important.

Team Identification

[*Note:* This was measured two ways, in terms of group identification (Kane et al., 2005) and organizational identification (Mael & Ashforth, 1992), in order to capture both relevant levels of potential social identification. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*.]

Group Identification

1. I identify with my workgroup.
2. I am glad to belong to my workgroup.
3. I see myself as someone from my workgroup.
4. I feel strong ties to the people in my workgroup.
5. I have a lot in common with the people in my workgroup.

Tie Strength

[*Note:* adapted from the Levin and Cross, 2004, measure of tie strength.]

1. How close is your working relationship with this person?

[Measured on a 7-point Likert scale: 1 = *very close*; 4 = *somewhat close*; 7 = *distant*.]

2. How often do you communicate with this person?

[Measured on a 7-point Likert scale: 1 = *daily*; 2 = *twice a week*; 3 = *once a week*; 4 = *twice a month*; 5 = *once a month*; 6 = *once every 2nd month*; 7 = *once every 3 months or less*.]

Perceived Expertise

[*Note:* Adapted from Van der Vegt et al.'s (2006) measure of expertness.]

How would you rate this person's expertise? (1 = *virtually novice*, 2 = *somewhat more than novice*, 3 = *moderately expert*, 4 = *expert*, 5 = *highly expert*)

How would you rate this person's competency on the job to others in the field with the same amount of experience? (1 = *far below average*, 2 = *below average*, 3 = *average*, 4 = *above average*, 5 = *far above average*)

Job Satisfaction

[*Note:* Measured using the Minnesota Satisfaction Questionnaire, as used by Price and Mueller, 1986. Measured on a 7-point Likert scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*.]

1. All in all, I am satisfied with my job
2. In general, I don't like my job.
3. In general, I like working here.

Conscientiousness

[*Note:* Measured with two items from the Ten Item Personality Measure, developed by Gosling et al., 2003. Measured on a 7-point Likert scale: 1 = *strongly disagree* to 7 = *strongly agree*. Extraversion: Items 1, 6 reverse scored. Agreeableness: Items 2 reverse scored, 7. Conscientiousness: Items 3, 8 reverse scored. Emotional stability: Items 4 reverse scored, 9. Openness to experiences: Items 5, 10 reverse scored.]

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

I see myself as:

1. _____ extraverted, enthusiastic.
2. _____ critical, quarrelsome.
3. _____ dependable, self-disciplined.
4. _____ anxious, easily upset.
5. _____ open to new experiences, complex.
6. _____ reserved, quiet.
7. _____ sympathetic, warm.
8. _____ disorganized, careless.
9. _____ calm, emotionally stable.
10. _____ conventional, uncreative.

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